United States Patent

[11] **3,583,562**

[72] Inventors **Lewis M. Yock**
Tigard;
Robert A. Browning, Jr, Portland, both of, Oreg.

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[73] Assignee **The Coe Manufacturing Company**
Painesville, Ohio

[54] **METHODS OF AND APPARATUS FOR STACKING VENEER SHEETS**
17 Claims, 28 Drawing Figs.

[52] **U.S. Cl.** **209/74,**
271/68, 271/74, 271/88, 271/89, 271/85
[51] **Int. Cl.** **B07c 5/38**
[50] **Field of Search** 209/73, 74, 111.6, 111.7; 271/64, 68, 86, 87, 88, 82, 79, 69, 74, 85

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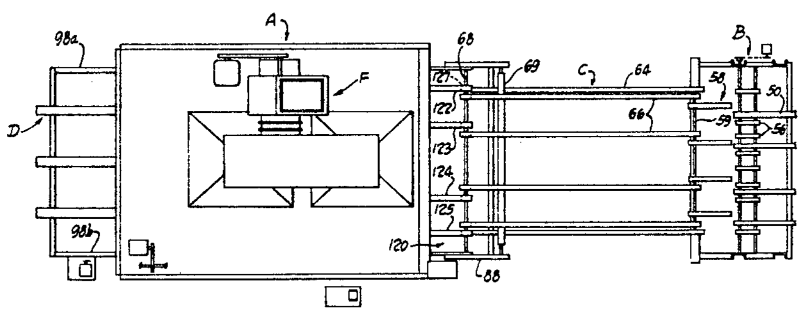
Primary Examiner—Allen N. Knowles
Attorney—Watts, Hoffmann, Fisher and Heinke

ABSTRACT: Sheets of veneer held against overhead belts by a pressure differential are moved over a plurality of bins, stripped from the belts over a selected bin, grasped at a leading portion, positively aligned against an abutment and deposited in the selected bin to form a stack.



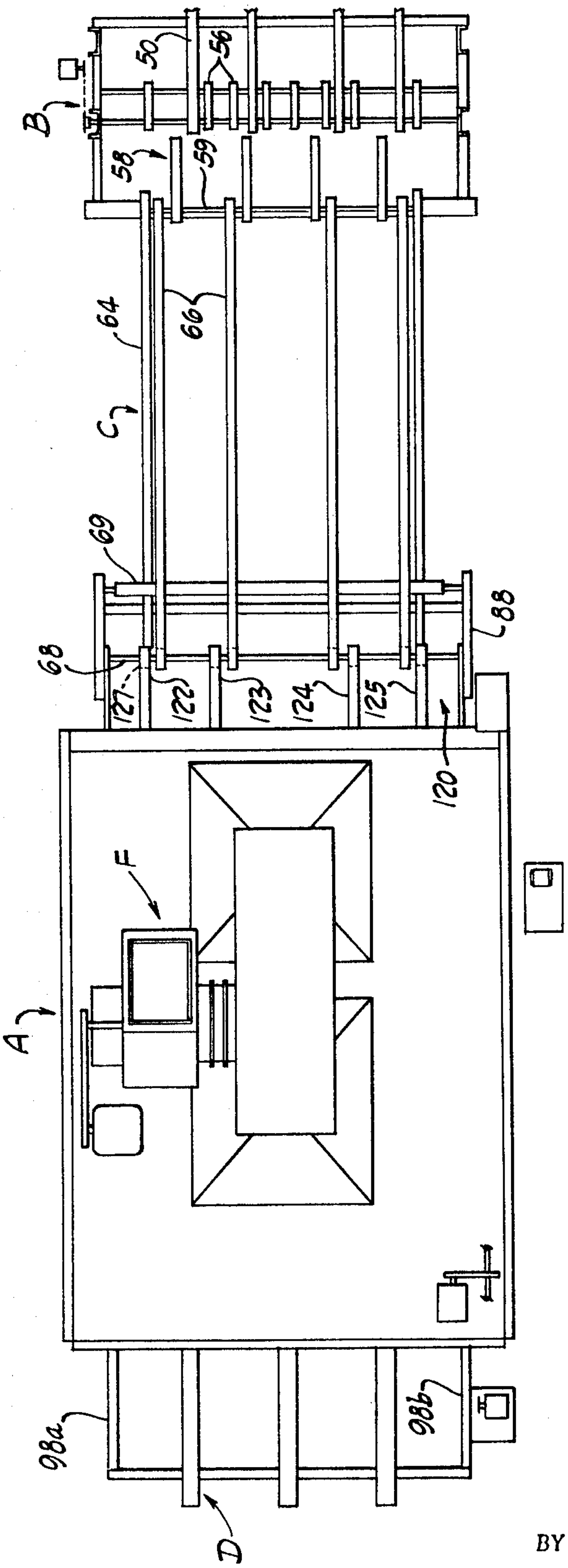


Fig. 1

INVENTORS
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann,
Fisher & Heinke
ATTORNEYS.

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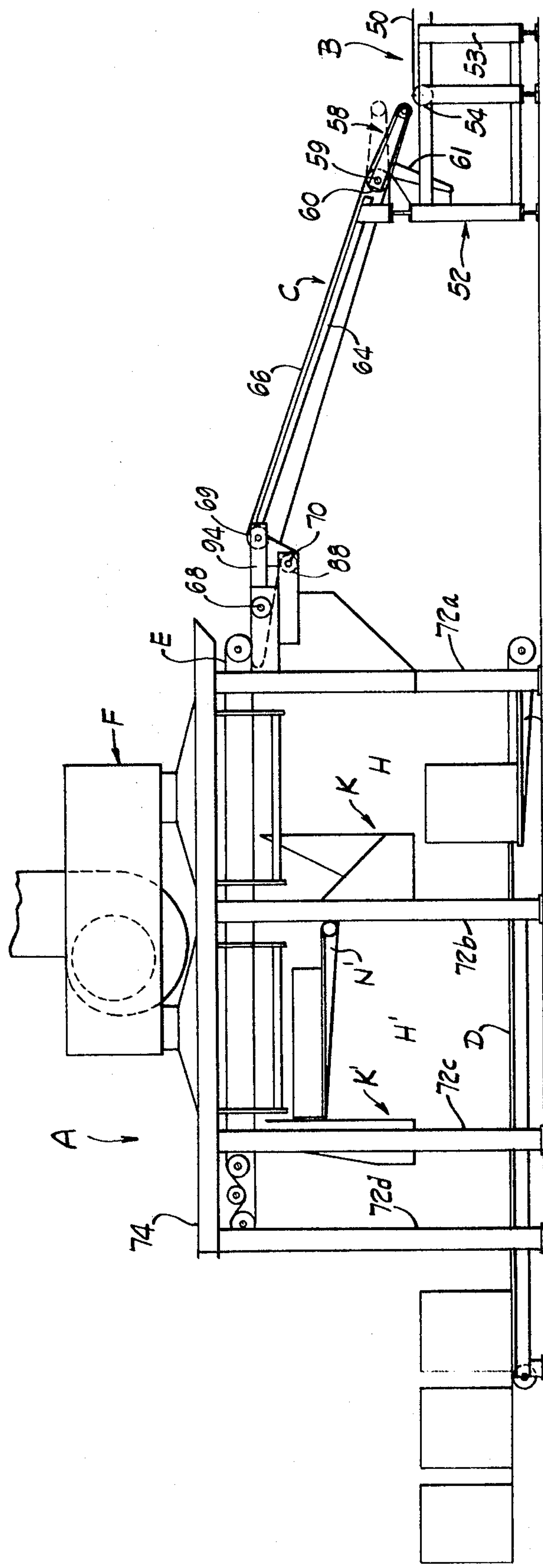


Fig. 2

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY *Watts, Hoffmann, Fisher & Heinke*
ATTORNEYS

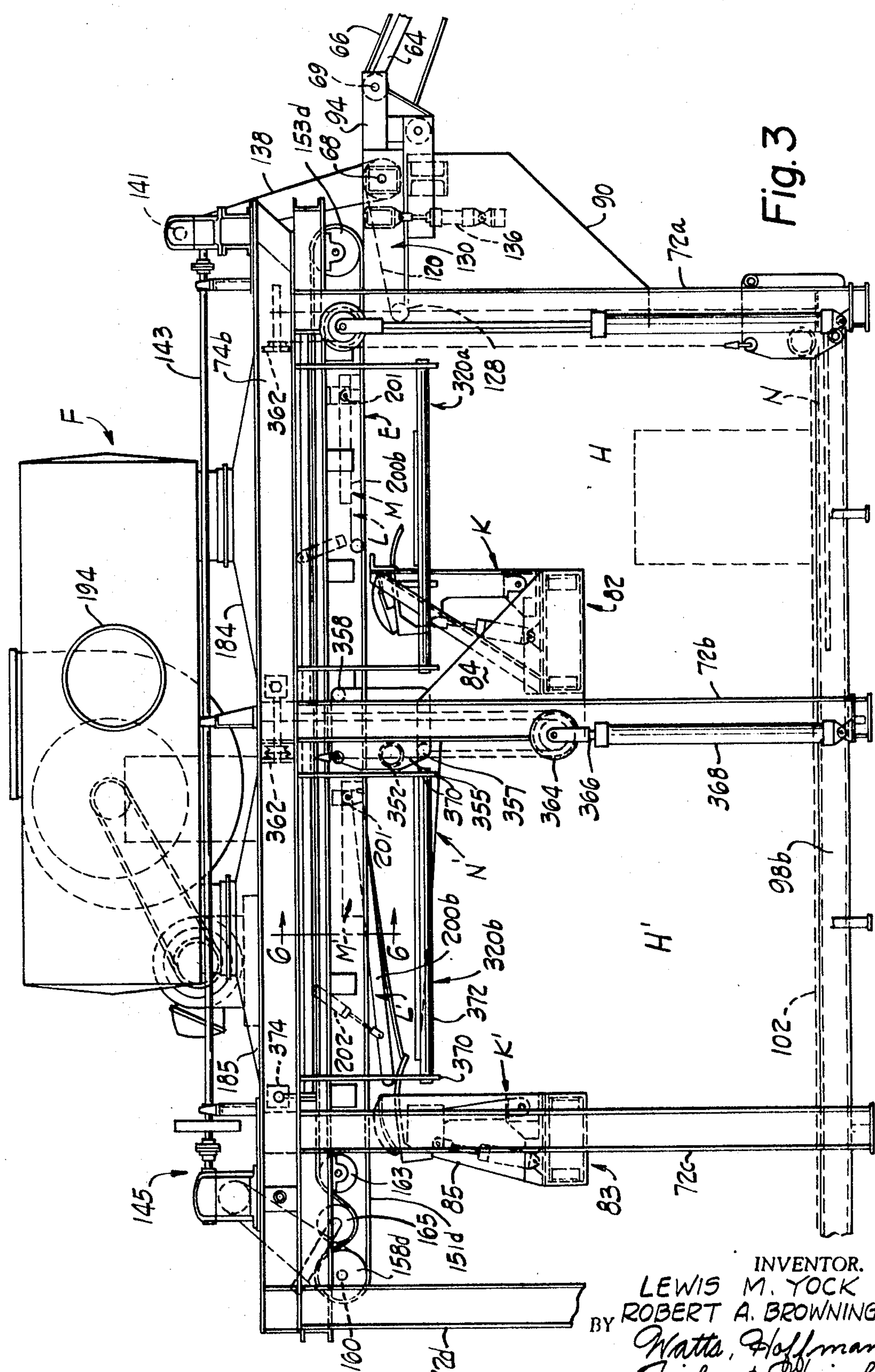


Fig. 3

INVENTOR.
LEWIS M. YOCK
BY ROBERT A. BROWNING JR.
Watts, Hoffmann,
Fisher & Heinke
ATTORNEYS.

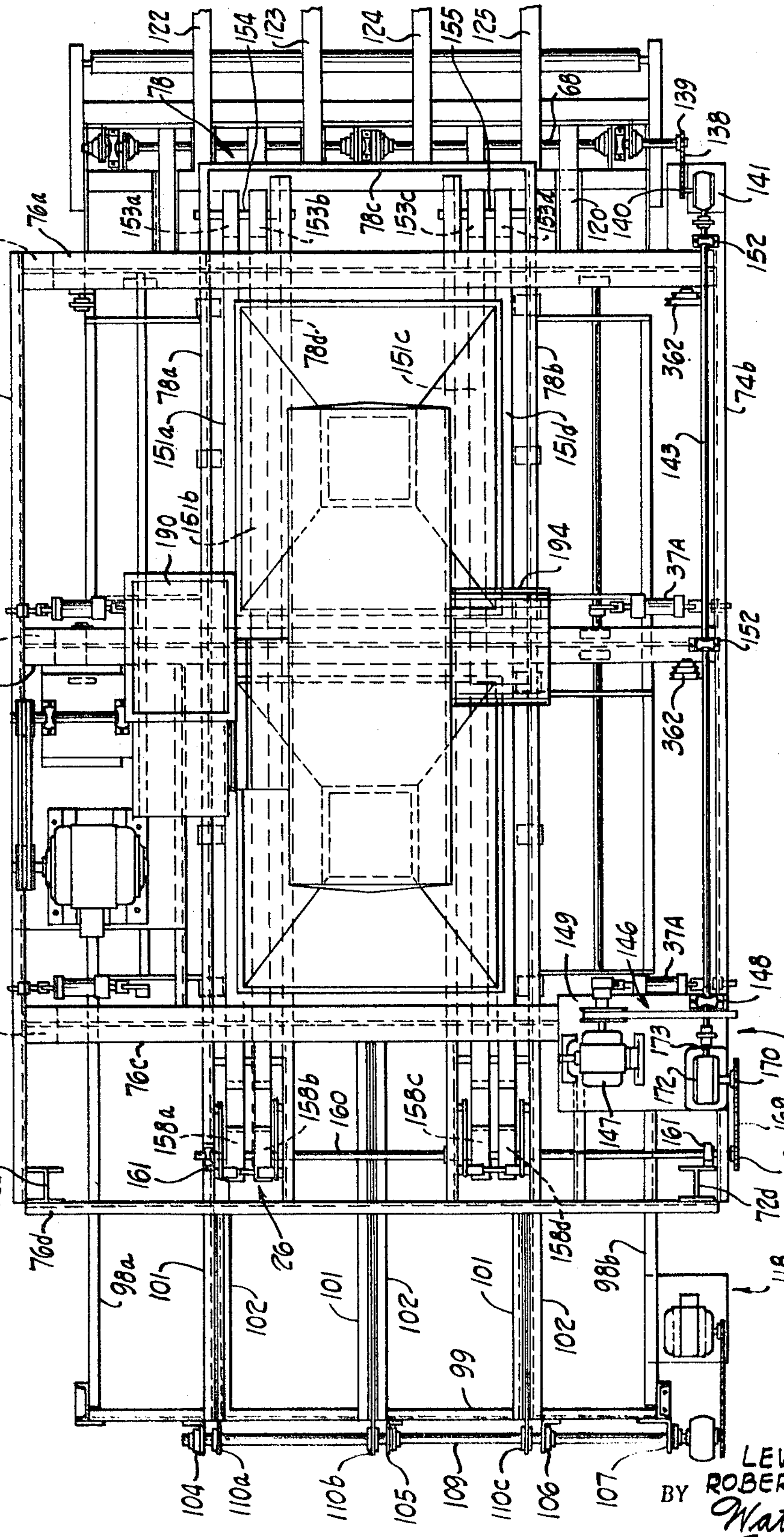
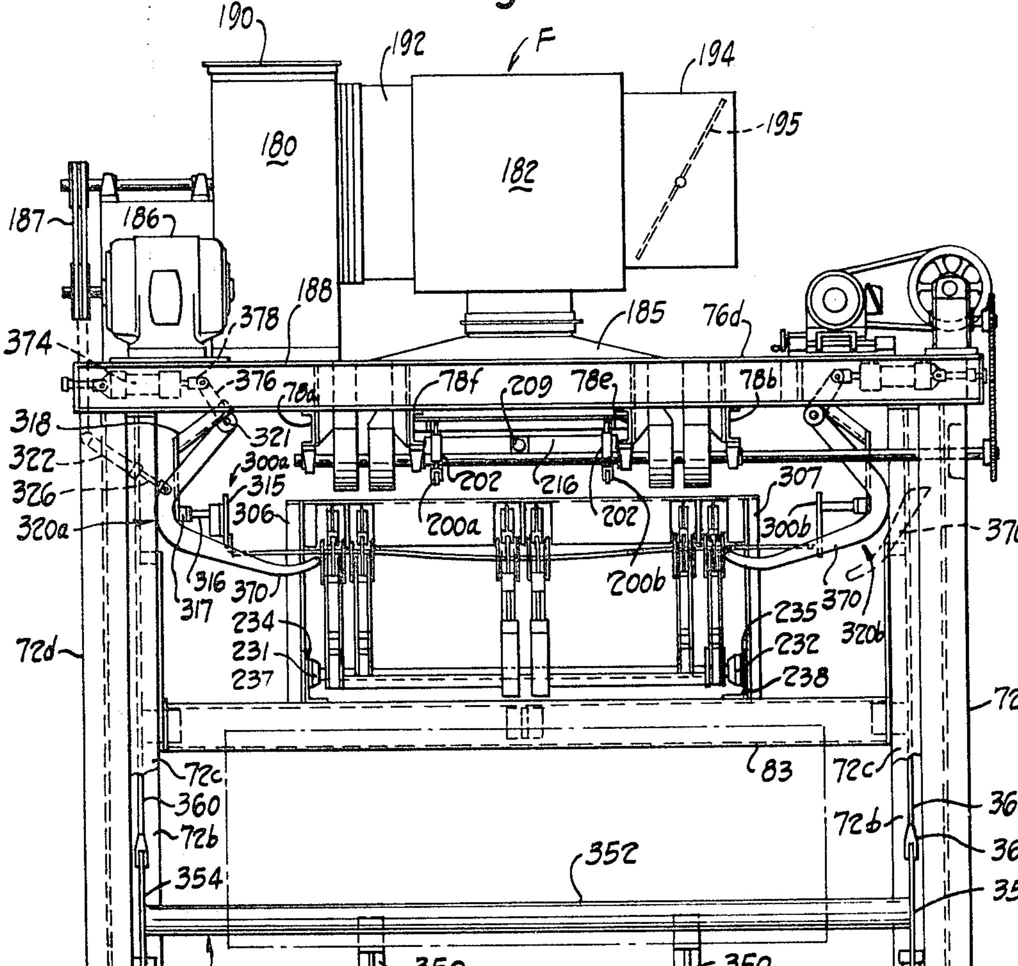
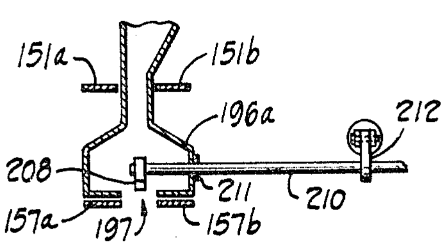


Fig. 4

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

Fig. 5





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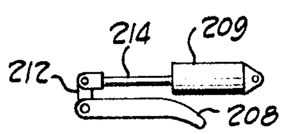
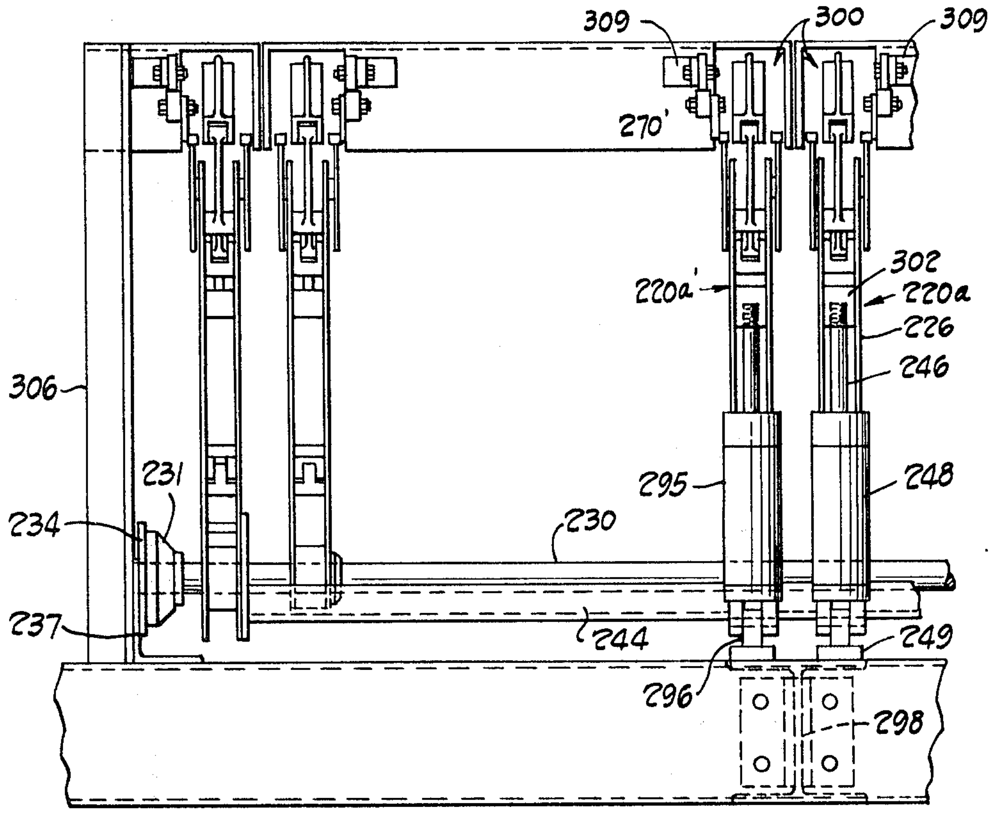


Fig. 7

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann,
Fisher & Heinke
ATTORNEYS.



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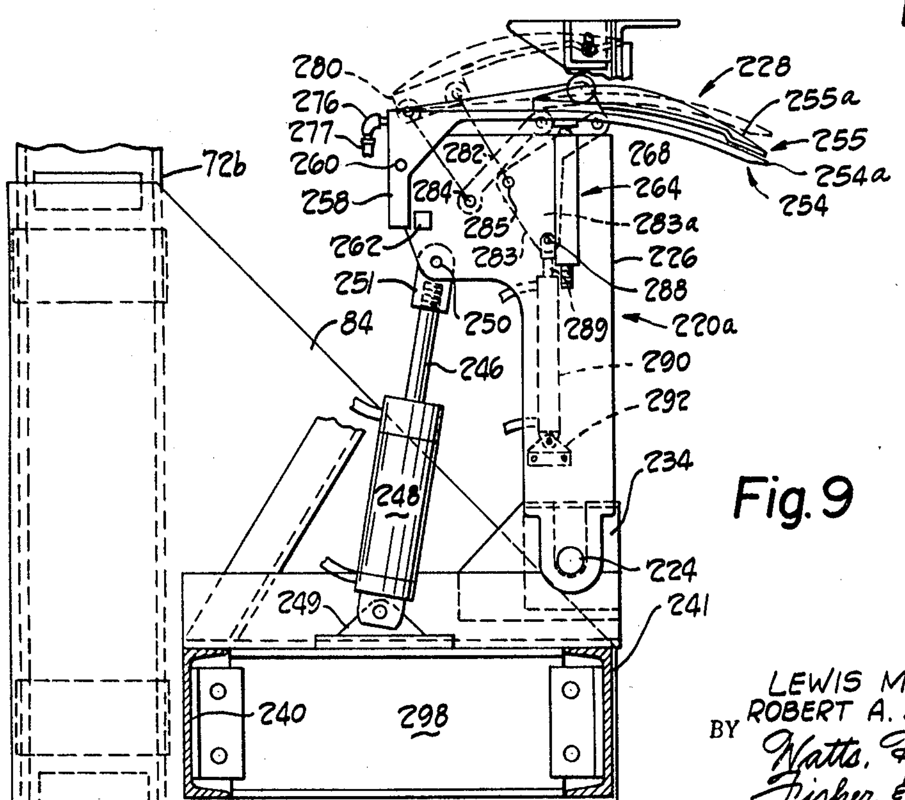
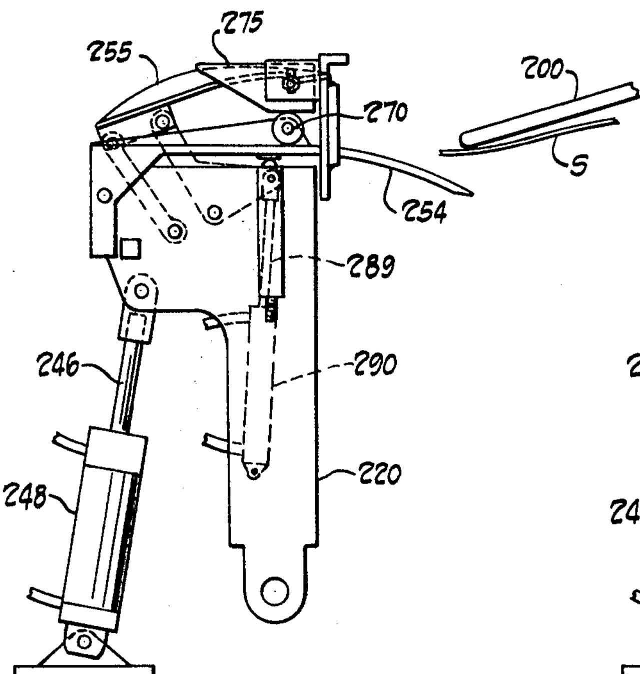


Fig.9

INVENTOR.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.



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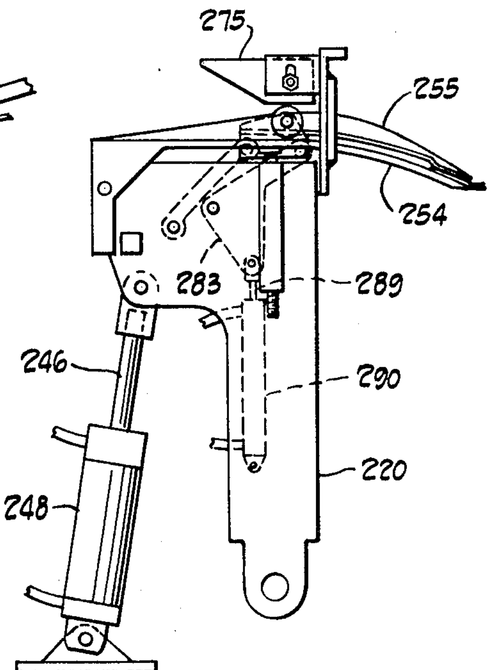

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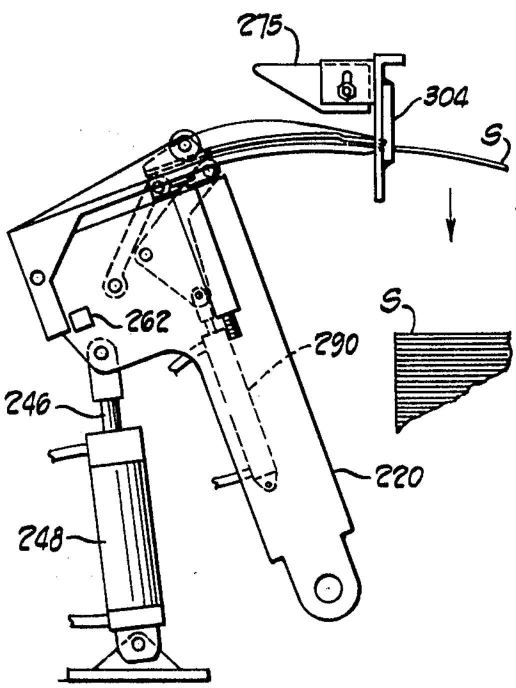

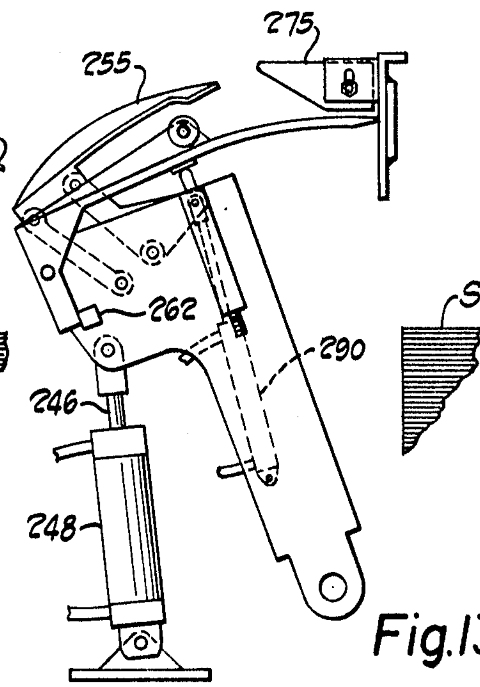

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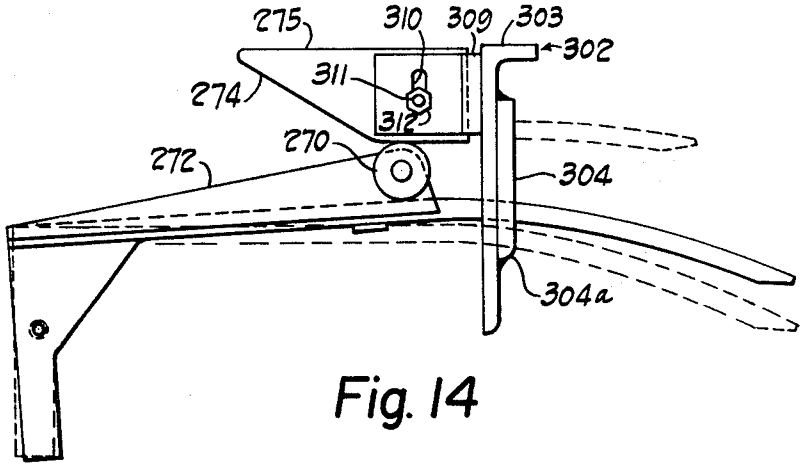
INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.



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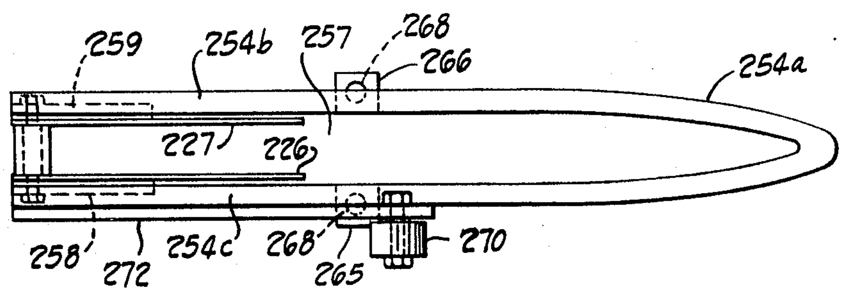

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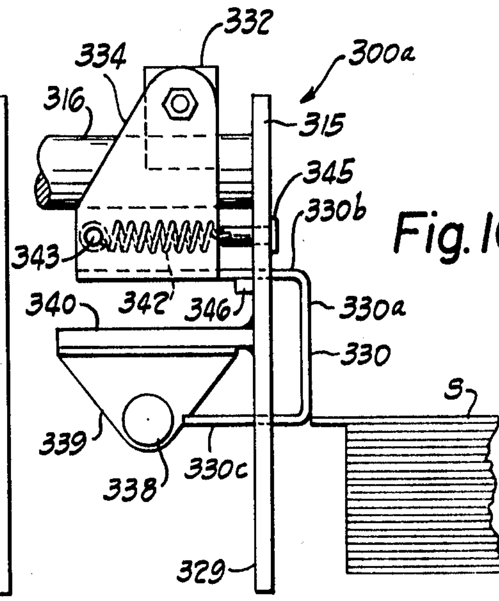

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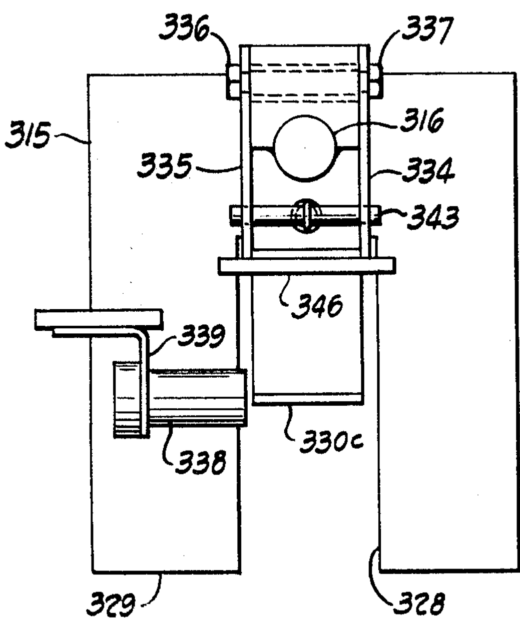
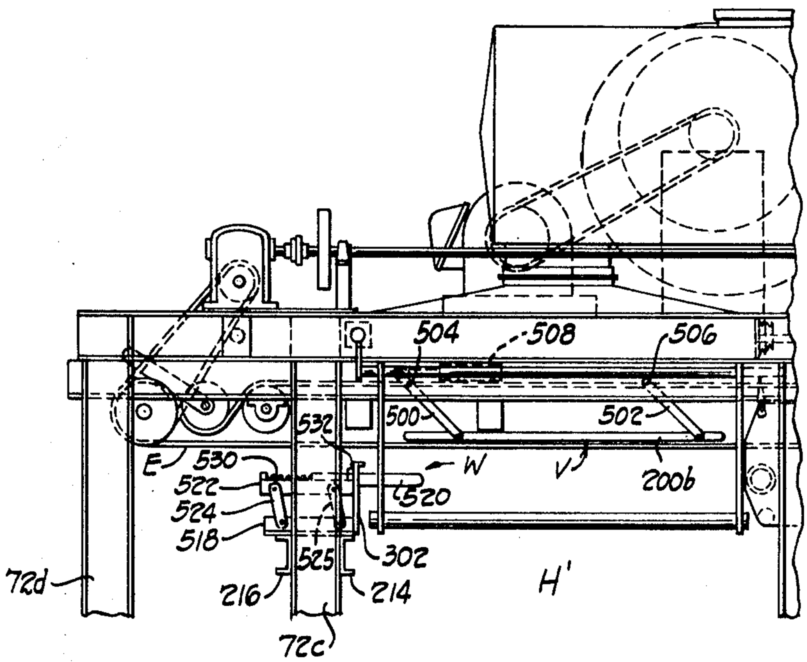


Fig. 17

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.



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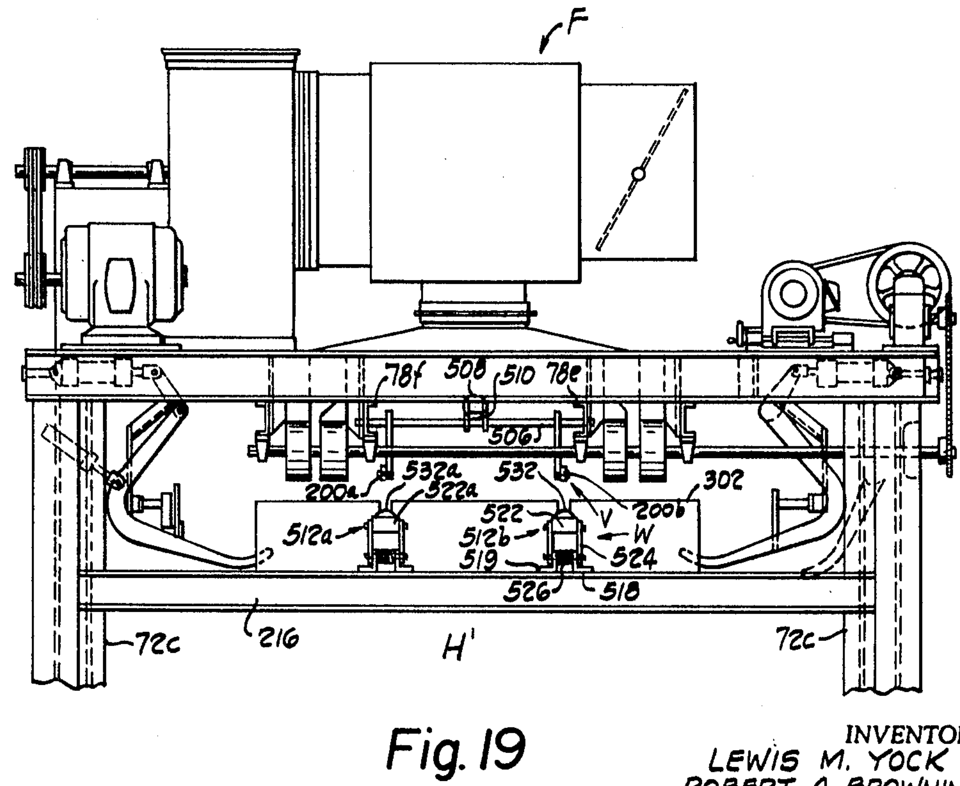

Fig. 19

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann,
Fisher & Heinke
ATTORNEYS.

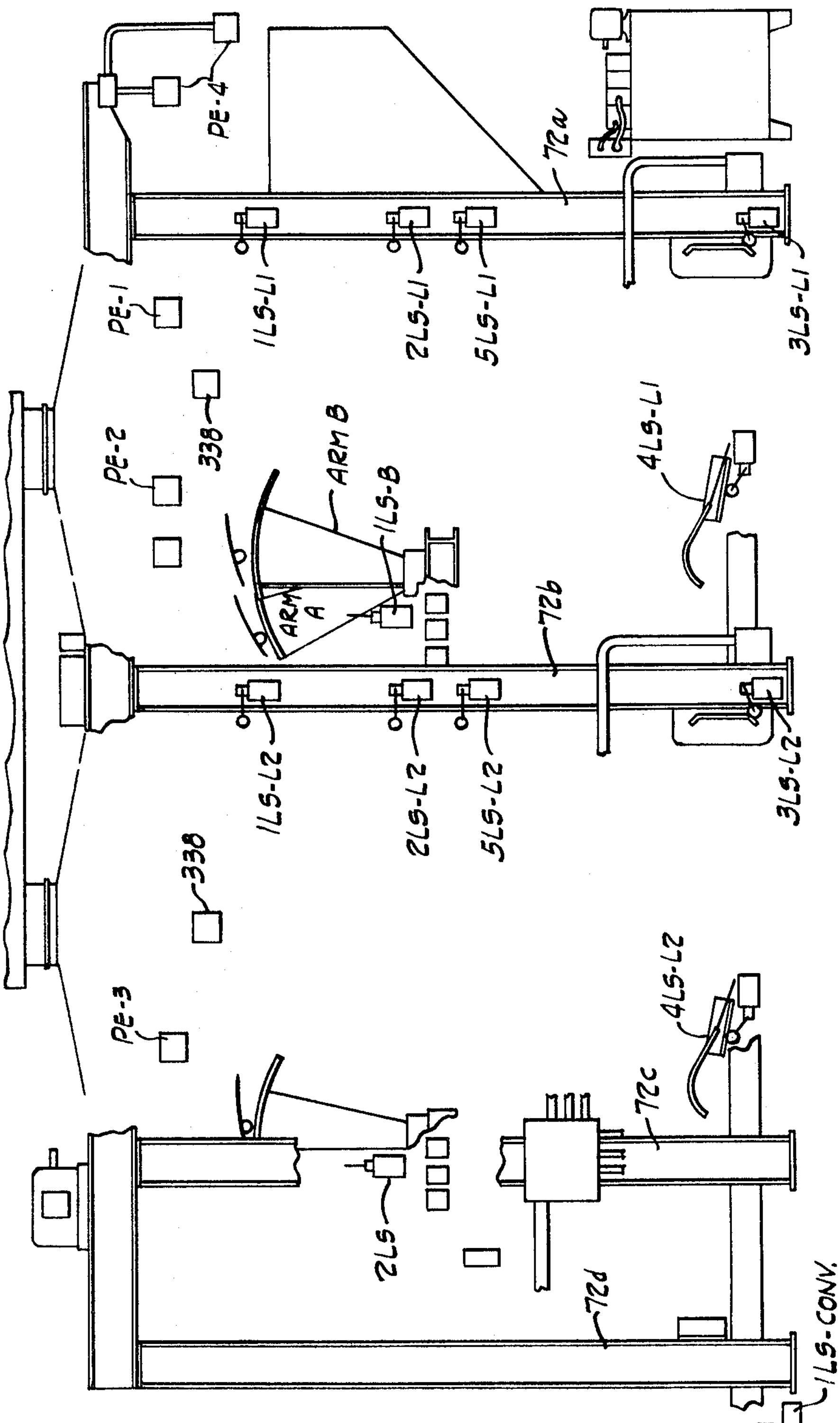

Fig. 20

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann,
Fisher & Heinke
ATTORNEYS.

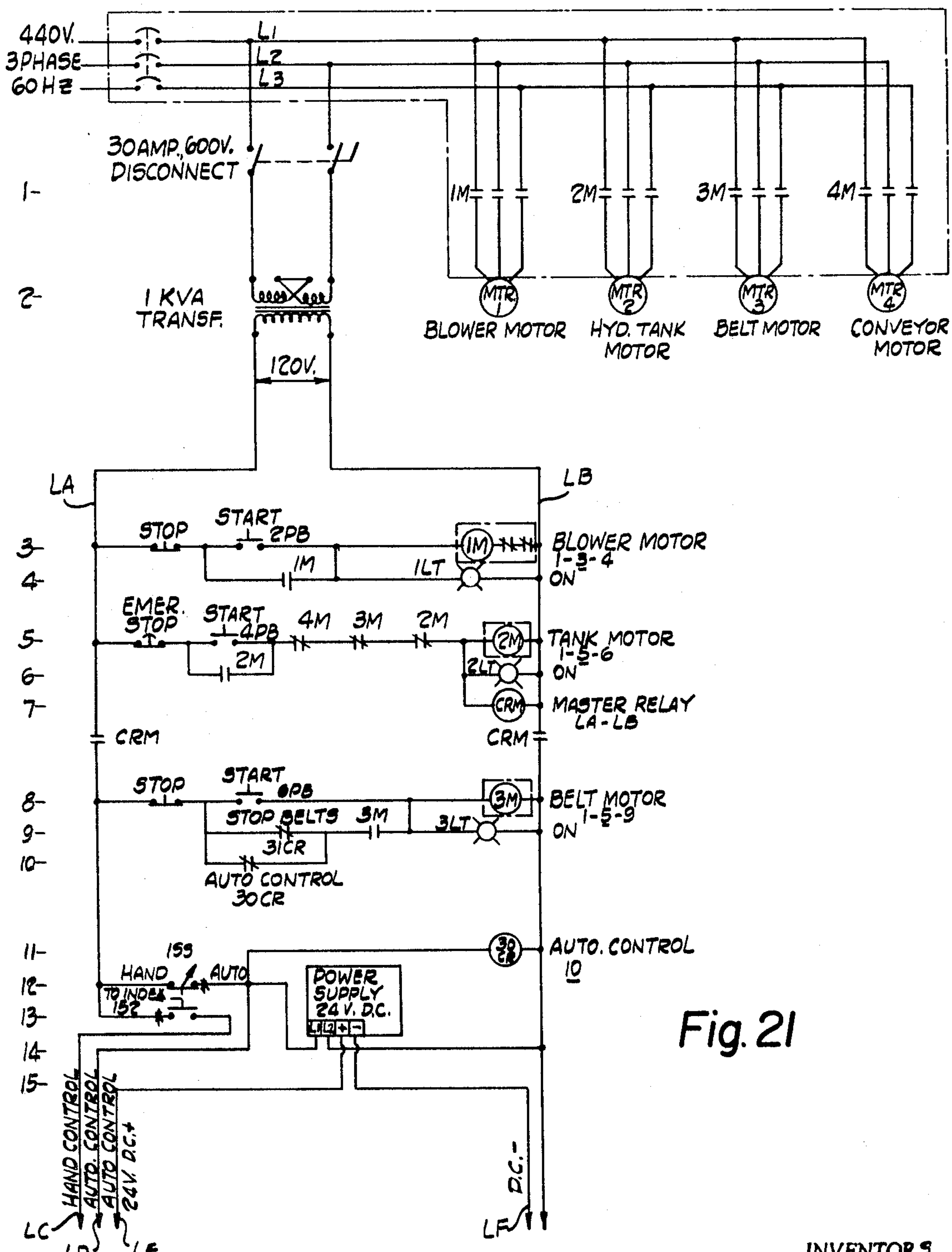

Fig. 21

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

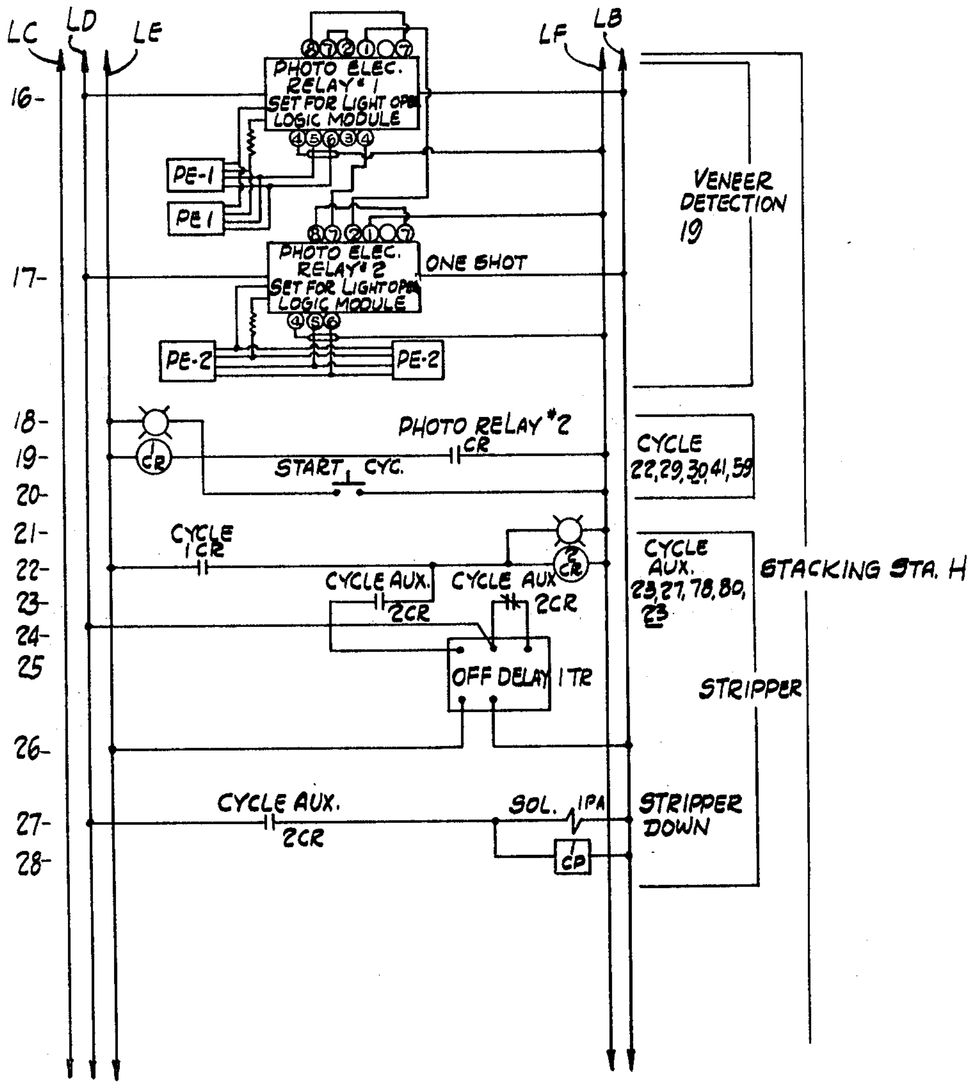

Fig. 22

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

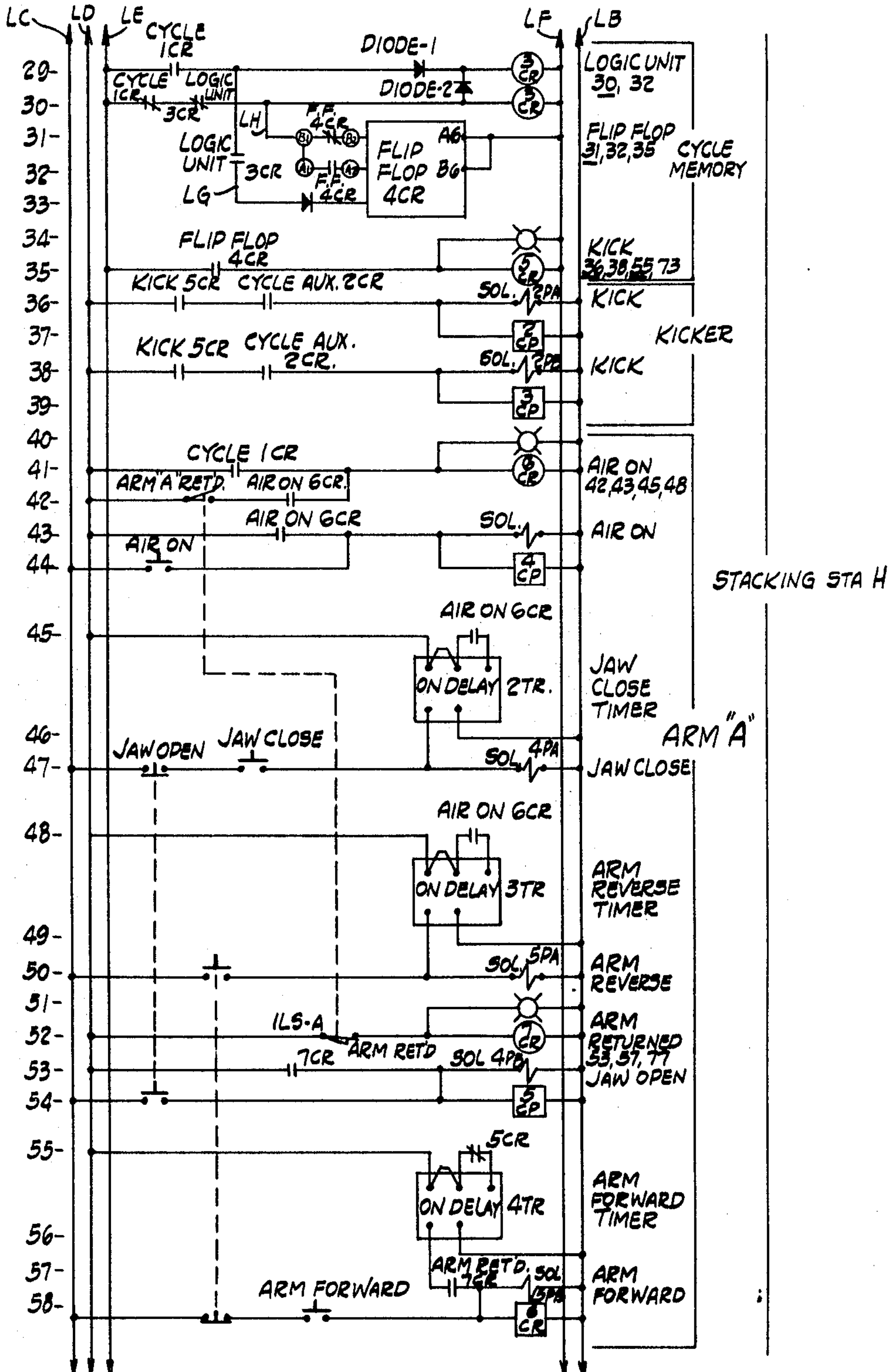

Fig. 23

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

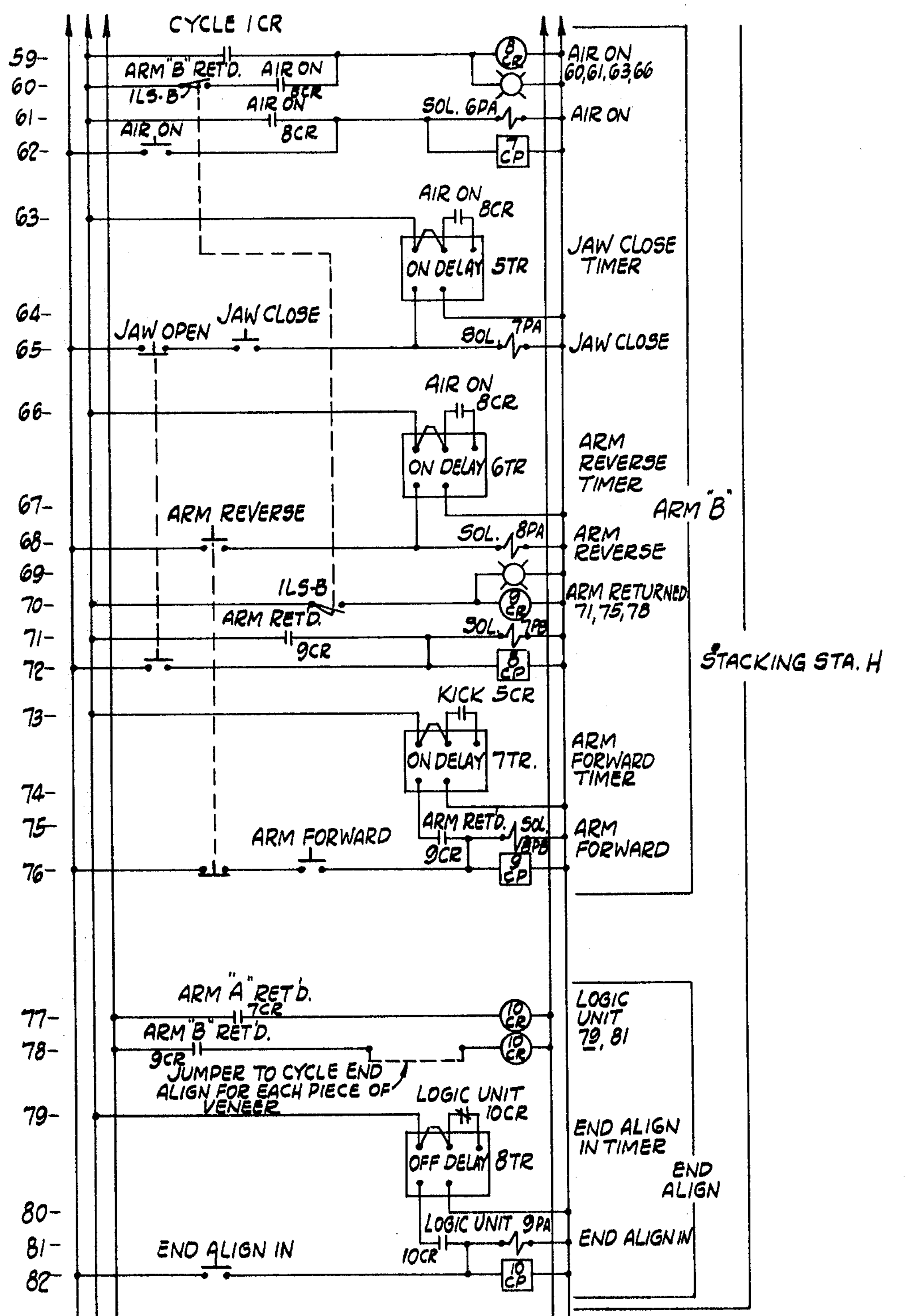

Fig. 24

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

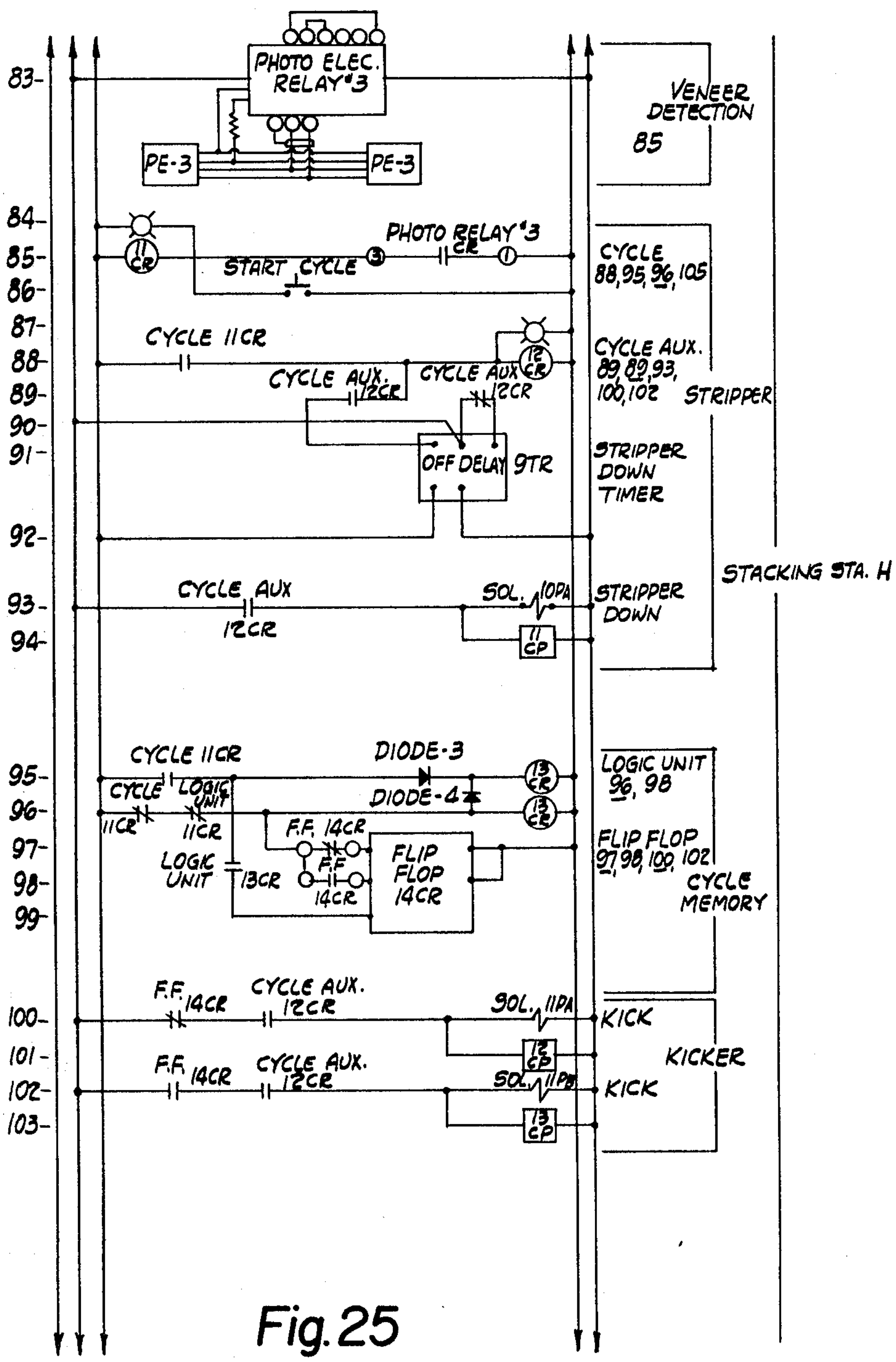

Fig. 25

INVENTORS
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

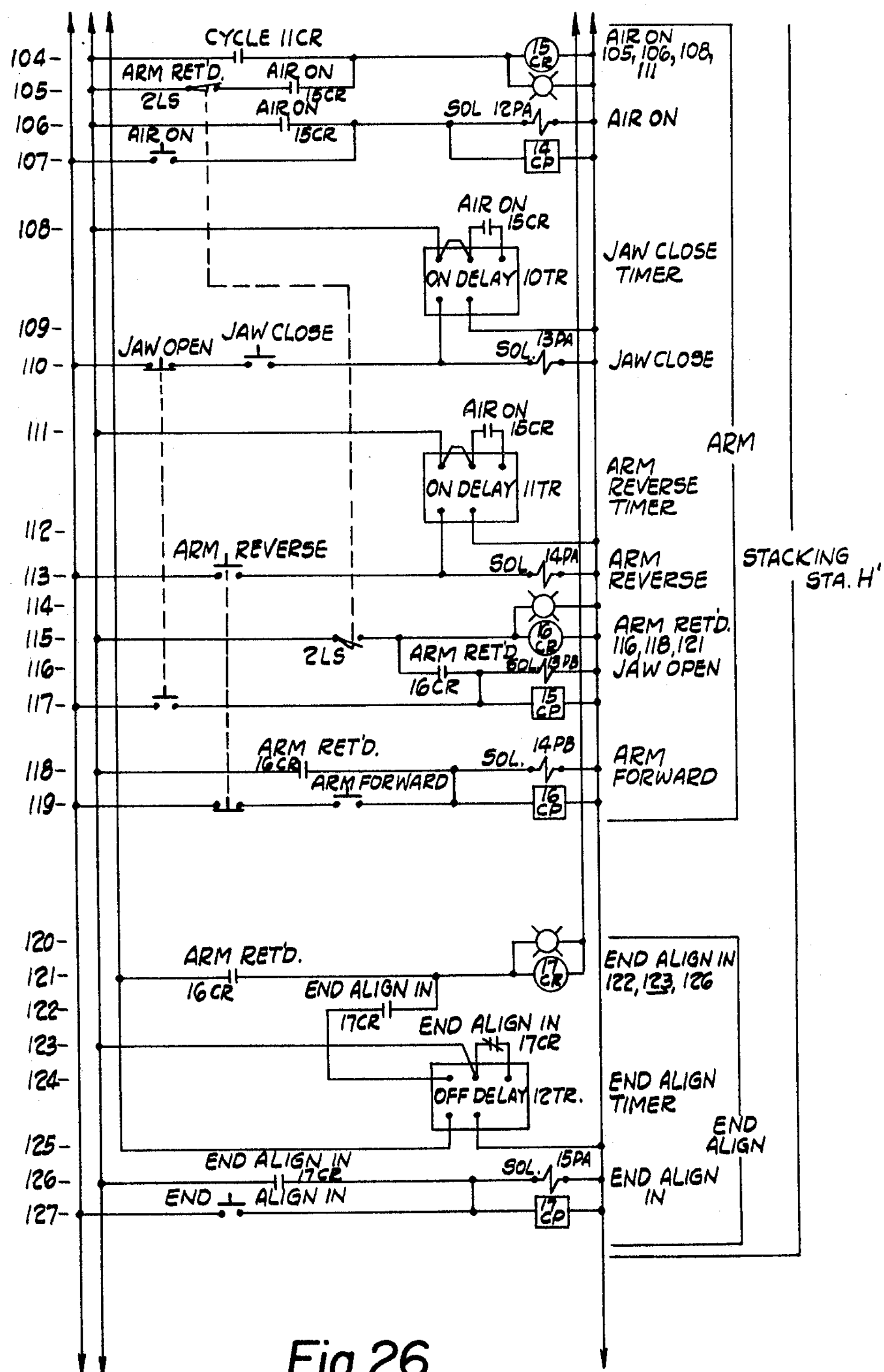

Fig. 26

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

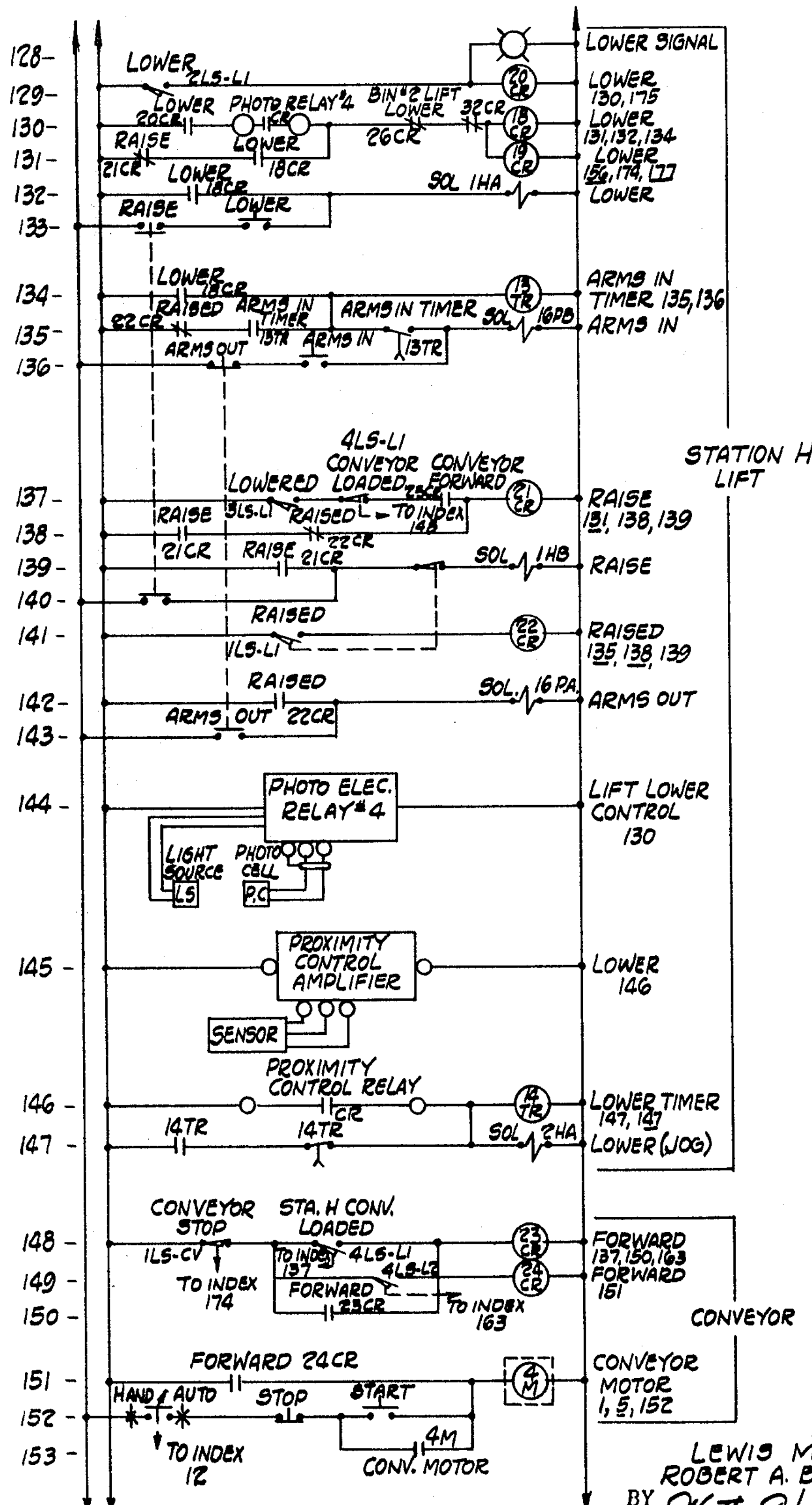

Fig. 27

INVENTORS.
LEWIS M. YOCK
ROBERT A. BROWNING JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

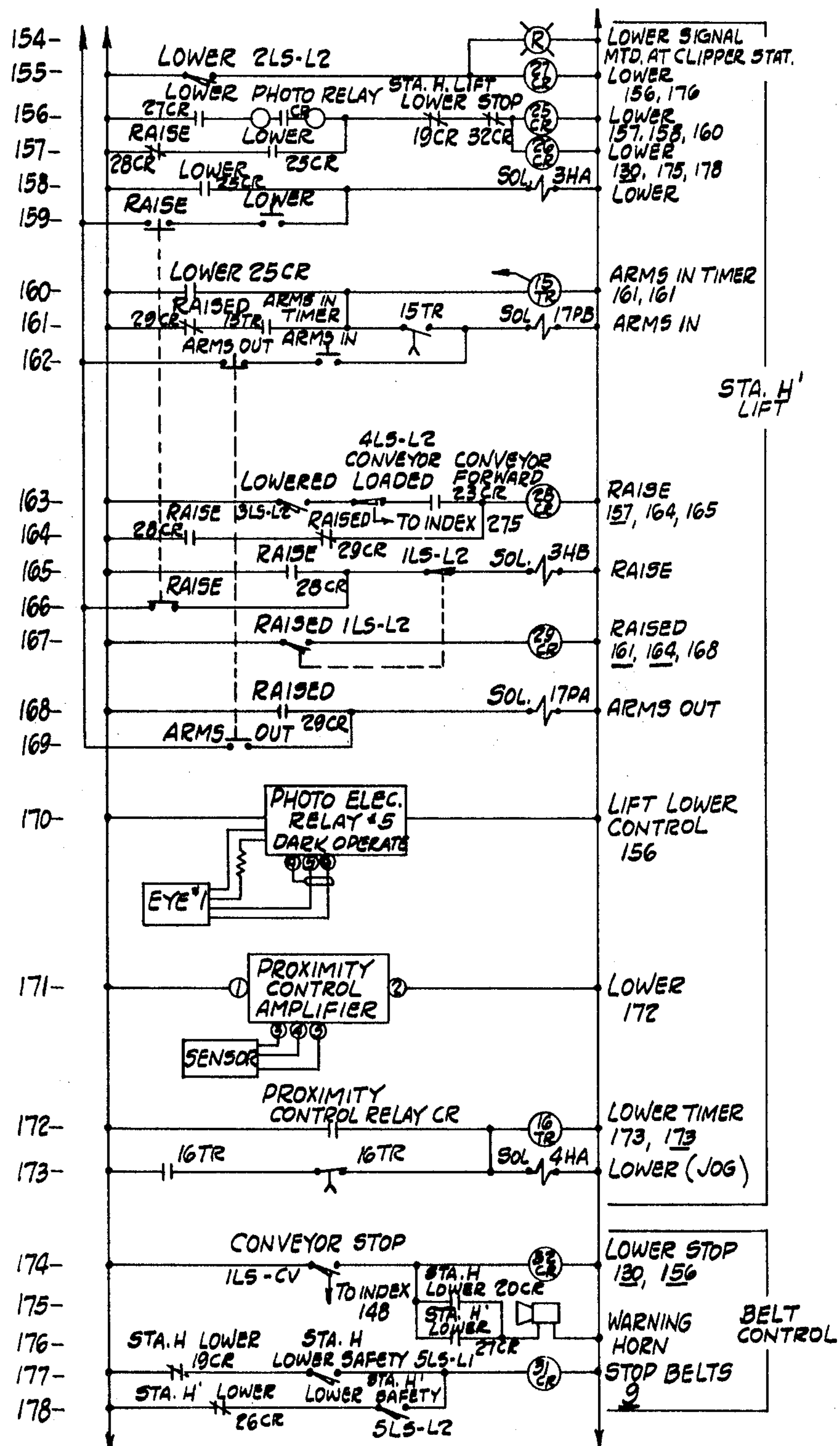

Fig. 28

INVENTORS
LEWIS M. YOCK
ROBERT A. BROWNING, JR.
BY Watts, Hoffmann, Fisher & Heinke
ATTORNEYS.

METHODS OF AND APPARATUS FOR STACKING VENEER SHEETS

This invention relates to methods and apparatus for handling and stacking sheets of wood veneer.

In the manufacture of wood veneer, the long strips of veneer are clipped into sheets of selected sizes. For convenience in handling and processing the clipped sheets, commonly referred to as veneer sheets or veneers, it is often desirable to arrange the sheets in a stack or in separate stacks according to sheet size and/or veneer grade etc. Because veneer sheets are flexible and fragile it is relatively difficult to automatically handle a continuing supply of sheets quickly and efficiently and to accurately align the sheets into one or more orderly stacks.

An object of this invention is to overcome the above-mentioned and other difficulties in handling veneer sheets by providing new and improved methods of and apparatus for efficiently and automatically stacking or sorting and stacking veneer sheets to grade and/or length, etc.

Another object of this invention is to provide novel methods of and apparatus for stacking sheets of veneer in one or a plurality of stacks and to stack the sheets at stations, according to the length of each sheet, with at least one edge of each sheet aligned with an edge of the stack.

Another object of the invention is to provide novel methods of and apparatus for handling sheets of veneer in which the sheets are frictionally engaged with moving belts above the sheets by a pressure differential, transported with the belts, stripped from the belts at a predetermined location to form a stack, and a leading portion of each sheet is grasped and positively pulled against an aligning abutment.

Another object of this invention is to provide novel and improved apparatus of of the character referred to including means receiving the leading edge of a sheet of veneer as it is stripped from beneath the conveyor, providing at least partial support for the sheet by a flow of gas therebeneath, yieldably gripping and drawing the leading edge of the sheet against a fixed abutment with a movable clamping means, and automatically moving the clamping means and providing the flow of supporting gas in response to a sheet of predetermined size being at a predetermined location in advance of and moving toward the clamping means.

A further object of this invention is the provision of novel and improved apparatus for aligning veneer sheets that are carried along a predetermined path and transferred to a stack of sheets, including a fixed stop member, a lower alignment member to receive and support a leading edge of the sheet and an upper alignment member initially displaced from and subsequently movable into overlying clamping relationship with the lower member to clamp a veneer sheet therebetween, and means to move both alignment members concurrently in the direction of sheet movement past the fixed stop member to carry the leading edge of a veneer sheet into abutment with the stop and strip it from the alignment members as the sheet is transferred to a stack.

These and other objects, features and advantages of this invention will become better understood from the following description of a preferred apparatus shown in the accompanying drawings, in which:

FIG. 1 is a plan view of automatic veneer sorting and stacking apparatus embodying the present invention;

FIG. 2 is a side elevational view of the sorting and stacking apparatus of FIG. 1 showing the general overall arrangement of the apparatus;

FIG. 3 is a partial side elevational view of the sorting and stacking apparatus of FIG. 2, on an enlarged scale, showing additional structural details;

FIG. 4 is a plan view of the apparatus of FIG. 3;

FIG. 5 is an end elevational view of the apparatus of FIG. 3, viewed from the left-hand side;

FIG. 6 is a fragmentary detailed view taken approximately along the line 6–6 of FIG. 3;

FIG. 7 is a fragmentary side elevational detailed view, with parts removed, of the apparatus of FIG. 6;

FIG. 8 is a partial end elevational view of the aligning apparatus shown in FIG. 4, on an enlarged scale;

FIG. 9 is a partial side elevational view of the aligning mechanism of FIG. 8 viewed from the right-hand side;

FIGS. 10 to 13 are diagrammatic side elevational views of the aligning mechanism of FIG. 9, illustrating the sequence of operation in receiving and aligning a veneer sheet to form a stack;

FIG. 14 is an enlarged side elevational view, with parts removed of a portion of the aligning mechanism of FIG. 9, illustrating structural details;

FIG. 15 is a plan view of the apparatus shown in FIG. 14, with parts removed;

FIG. 16 is an end elevational view of a movable end aligning abutment and proximity switch;

FIG. 17 is a side elevational view of the apparatus of FIG. 16 as viewed from the left side;

FIG. 18 is a fragmentary side elevational view of apparatus similar to that shown in the preceding figures, showing an alternative construction;

FIG. 19 is a fragmentary end elevational view of the apparatus of FIG. 18;

FIG. 20 is a diagrammatic side elevational view of the sorting and stacking apparatus with parts removed, illustrating the location of control elements associated with the structure; and

FIGS. 21 to 28 are wiring diagrams of the control circuit for the apparatus.

GENERAL ARRANGEMENT AND OPERATION

The general arrangement of preferred apparatus for sorting and stacking veneer sheets, embodying the present invention, is best shown in FIGS. 1 and 2 of the drawings. The apparatus includes a sorter-stacker apparatus A that received veneer sheets of different widths from a veneer clipper (not shown) via a preliminary sorter B and a feed conveyor C. The preliminary sorter B is used to eliminate defective or scrap pieces of veneer. The sorter-stacker apparatus A sorts and stacks sheets according to size and deposits the stacks on a takeoff conveyor D, from which the stacks are removed in any conventional manner.

Sheets of veneer are received by the sorter-stacker apparatus A from the conveyor C by an overhead conveyor E of the sorter-stacker apparatus A. The sheets are held in frictional engagement against the lower reaches of the overhead conveyor E by a pressure differential created by a vacuum generator assembly F, and are moved by the conveyor E to stacking stations at which the sheets are deposited according to size. In the embodiment shown, two such stacking stations H, H′ are employed, in the first of which wider sheets are stacked. The presence of a sheet of proper width is sensed photoelectrically when the sheet is over the stacking station in which it is to be stacked. More or less than two stacking stations can be provided as desired. It is also to be understood that different sensing equipment may be employed and that the sheets may be stacked according to grade or quality of veneer, thickness, etc., by the use of suitable sensing equipment.

Associated with each stacking station is a sheet stripper mechanism L, L′ and a sheet kicker mechanism M, M′ for removing veneer sheets from the overhead conveyor. The sheets are positioned in an orderly stack at each station by a side aligning mechanism that receives and aligns the leading sides or edges of the veneer sheets as they are removed from the overhead conveyor and an end aligning mechanism that aligns the ends of the sheets.

The stripping mechanism or stripper is above the overhead conveyor and is lowered to strip the leading edge of a veneer sheet from the overhead conveyor and to guide it to the edge aligning mechanism. The kicking mechanism or kicker kicks the trailing portion of the veneer sheet being stripped from the overhead conveyor to free the trailing portion of the sheet from the conveyor. The stripper and kicker are actuated automatically in response to the photoelectric sensing of the sheet over the stacking station.

A leading side aligning mechanism, K, K' while in a forward position, receives and supports a leading portion of the veneer sheet stripped from the overhead conveyor, clamps the leading edge of the sheet and moves to a rearward position, pulling the leading edge of the veneer sheet in the direction of sheet movement against an abutment that positions the leading edge in a desired location. The sheet slips from the aligning mechanism when forward movement of the sheet is restrained by the abutment and the sheet drops to form a stack. A blast of air is provided beneath the sheet during the stripping and aligning action to provide an air support for the sheet and cushion its fall upon the stack.

The stacks are formed on vertically movable stack supports N, N' which are lowered in incremental steps as the stacks of sheets are formed thereon. The end aligning mechanism at the respective stacking station moves inward periodically and aligns the edges of the sheet that extend in the direction of sheet movement, senses the stack height, and automatically causes the stack support at the station to be jogged downward whenever the stack height exceeds a predetermined level. When the stack support reaches a predetermined down position, the stack is the desired height and the support is automatically lowered to deposit the stack on the takeoff conveyor D. During such transfer of a completed stack, a veneer accumulator moves into position beneath the overhead conveyor to receive veneer sheets stripped from the conveyor until the stack support is returned to its up position. The veneer accumulator is then withdrawn, the accumulated sheets deposited on the stack support and the operation continues.

PRELIMINARY SORTER AND BELT CONVEYOR

The preliminary sorter B is located at the end of a belt conveyor **50** and comprises a generally rectangular-shaped framework **53** supported at floor level. The framework **53** carries a pulley shaft assembly **54** that supports and drives one end of the belt of conveyor **50**. The conveyor **50** delivers sheets of veneer conveyed thereby either onto a belt conveyor assembly **58** pivotable about its downstream driven pulley shaft **59** or into a pit or the like below the framework **53**, depending upon the vertical position of its upstream end, which is adjacent to the discharge end of conveyor **50**. The conveyor assembly **58** is raised and lowered as by a rocking frame **61**. In its lower position, as shown in FIG. **2**, the upstream end of the conveyor assembly **58** is in position to receive sheets from the conveyor **50**. When moved to its upper position, as shown in phantom, the conveyor **50** discharges in a pit beneath the frame **53**. The conveyor assembly **58** is manually raised to prevent material which it is desired not to stack from reaching the sorter-stacker infeed conveyor C.

The infeed conveyor C includes a framework **64** supported at the upstream end of the conveyor on the framework **52** and at the downstream end of the conveyor by the sorter-stacker apparatus A. The conveyor C includes a plurality of belts **66** trained about pulleys on the shaft **59** previously referred to and a shaft **68** of the sorter-stacker apparatus. Transverse guide rolls **69**, **70** carried by the sorter-stacker apparatus A guide the belts **66** to produce an inclined and a horizontal section for the conveyor C. The horizontal section leads directly to the sorter-stacker proper.

SORTER-STACKER APPARATUS

The sorter-stacker apparatus A, as best shown in FIGS. **3—5**, is formed of a generally open framework comprised of spaced, floor-supported, uprights **72**. Four such uprights, **72*a***, ***b***, ***c***, ***d*** are on each side of the path of sheet travel defined by the overhead belt conveyor E and support a longitudinal horizontal beam **75*a*** and **74*b*** on each side of the apparatus, which are connected by transverse horizontal beams **76*a***, ***b***, ***c***, ***d*** at each upright.

An upper subframe **78** is supported directly beneath the transverse beams **76** for supporting the overhead belt conveyor E. The subframe **78** includes longitudinal channels **78*a***, ***b*** of the main framework. At one end, the channels **78*a***, **78*b*** terminate at the crossmember **76*d***. The opposite ends of the channels are joined by a crossmember **78*c***. Two longitudinally extending inwardly located channels **78*d***, **78*e*** extend parallel to the channels **78*a***, **78*b*** between crossmembers **76*d*** and **78*c***. The overhead belt conveyor E extends longitudinally, supported by the subframe **78*b*** and the crossmembers **76** of the main framework.

Transverse supports **82**, **83** extend across the main framework to support the side or leading edge aligning mechanisms K, K'. As shown, the transverse support **82** extends across the uprights **72*b***, approximately midway along their height and is secured in a position forward of the uprights by supporting gussets **84** on opposite sides. The transverse support **83** is secured between the uprights **72*c*** by gussets **85** at opposite sides and is not as far forward with respect to the uprights in order to provide a somewhat larger stacking station or area for receiving veneer sheets of larger dimensions.

A short cantilevered frame portion **88** extends from the receiving end of the main framework at a level beneath the longitudinal and transverse beams **74**, **76** and is secured to end uprights **72*a*** by gussets **90** at opposite sides. The frame **88** supports the drive pulley shaft **68** and supports the guide rolls **69**, **70** all associated with the belt conveyor C. The lower guide roll **69** is carried directly by the frame **88** and the roll **70** is carried at each end by longitudinal channels **94** upwardly offset from the frame portion **88**.

The takeoff conveyor D extends longitudinally between the uprights **72**, approximately at floor level and includes longitudinally extending beams **98*a***, **98*b*** (FIGS. **1** and **3**) across the uprights **72*b***, ***c***, ***d*** and has crossbeams, one of which is shown at **99** in FIG. **4**, extending between the longitudinal beams **98*a***, **98*b*** at stacked intervals. The crossbeams support longitudinally extending belt support strips **101** for three transversely spaced, longitudinally extending, chain-driven, conveyor belts **102** of the takeoff conveyor D. Bearing support brackets **104—107** are secured to the end crossbeam **99** and journal a conveyor drive shaft **109** that carries three sprockets **110*a***, ***b***, ***c*** for driving the chain belts **102**.

Floor support brackets **112**, **113**, **114** are located at the opposite end of the takeoff conveyor D between the uprights **72*a*** and support an idler shaft **115**, and sprockets **116*a***, ***b***, ***c*** for the chain belts **102**. A floor supported motor drive unit **118** is located adjacent one end of the drive shaft **109** and drives the takeoff conveyor D.

The vacuum generator assembly F is supported atop the main framework, by the transverse beams **76*b***, ***c*** and in part by the longitudinal channel members **78*d***, ***e*** of the subframe **78**. Open stacking stations or areas H, H' are located beneath the vacuum generator assembly F, below the horizontal longitudinal and transverse channels of the subframe **78**, longitudinally between the uprights **72*a***, ***b*** and **72*b***, ***c***, respectively. The lift supports N, N' at each stacking station are guided in a horizontal path by the uprights **72*a***, **72*b***. For this purpose the uprights **72*a***, **72*b*** are each formed of two channel members with the web portions in face-to-face but spaced relationship forming a vertical guide slot through which a portion of the lift support extends, as will be described in more detail in connection with the description of the lift supports.

A short belt conveyor **120**, FIGS. **1—4**, receives and supports sheets of veneer from the belt conveyor C and directs the sheets in a horizontal path to a location beneath the overhead conveyor E. The belt conveyor **120** includes four short, transversely spaced, belts **122—125** that extend longitudinally from the drive-pulley shaft **68** in the direction of sheet movement. Each belt is supported by two pulleys, one pulley on the shaft **68** and another pulley on a shaft **128** at the end of a frame support pivotally connected to the drive pulley shaft **68**. The pivotable frame **130** includes a transverse tubular beam **132** having a fluid motor **136** connected to the supporting framework for adjusting the position of the pivotable frame

130 about the shaft **68**. The belts **122—125** extend a short distance beneath the overhead belt conveyor E so that veneer sheets conveyed thereby are positively carried to a position beneath the overhead conveyor.

The drive shaft **68** is driven by a chain **138** connected between a sprocket **139** on the end of the shaft **68** and a sprocket **140** on the output shaft of a gearbox **141** supported above the transfer belt conveyor on the longitudinal horizontal beam **74*b***. The gearbox **141** is driven by an input drive shaft **143** that extends along the beam **74*b*** to a drive unit **145** at the opposite end of the beam **74*b***. The drive unit **145** includes a variable speed pulley drive **146** connected between an electric drive motor **147** and the drive shaft **143** which is supported in a bearing block **148** adjacent the pulley drive **146** and additional bearing blocks **151**, **152** spaced along the beam **74*b***. The motor **147** and bearing block **148** are supported on a mounting plate **149** on the framework beams **74*b*** and **76*c***.

The overhead conveyor E is best shown in FIGS. 3—5. The conveyor comprises four transversely spaced, longitudinally extending belts **151** arranged in two pairs, **151*a***, **151*b*** and **151*c***, **151*d***. The pairs **151*a***, **151*b*** and **151*c***, **151*d*** are widely spaced laterally of the path of sheet travel, and the belts of each pair are narrowly spaced from each other. The belts **151*a***, **151*b*** and **151*c***, **151*d*** trained about pairs of pulleys **153*a***, **153*b*** and **153*c***, **153*d*** supported on a shaft **154**, **155**, respectively, at the input end of the sorter-stacker A, which shafts are in turn supported in subframe channels **78*b***, **78*e***. Pulleys **158*a*—*d*** support the belts **151** at the opposite end of the sorter-stacker apparatus A and are carried on a common drive shaft **160** supported by bearing blocks **161** secured to the subframe channels **78*a***, **78*b*** and to the upright **72*d***. Pulleys **163** for supporting the upper reaches of the belts **151** are located adjacent each pulley **158** and a downwardly biased, movable idler pulley **165** rides on top of the upper reach of each belt between the pulleys **163** and **158** to maintain the belts under tension. The pulleys **153** and **158** are positioned so that the lower reaches of the belts **151** extend at a level just above the level of the transfer conveyor belts **12*c*** and the lower reaches of the belts **151** establish a path of sheet travel through the sorter-stacker apparatus A.

The drive shaft **160** for the pulleys **158** is driven by a sprocket **168** on the end of the shaft **160** via a chain **169** driven from a sprocket **170** on the output shaft of a gearbox **172** on the support plate **153** of the drive unit **145**. An input shaft **173** to the gearbox **172** is coupled to the variable speed pulley drive **148**, which also drives the transfer conveyor **120**. With this arrangement, any adjustment in speed through the variable speed pulley drive **146** affects both the transfer conveyor **120** and the overhead conveyor E so that the two are driven in synchronism.

The vacuum generator assembly F serves to reduce the ambient pressure above the veneer sheets that are moved into a position beneath the overhead belt conveyor E, and thereby hold the veneer sheets in frictional engagement with the lower reaches of the overhead conveyor belts. The assembly F includes a blower **180**, a vacuum chamber **182**, and two intake hoods **184**, **185**. The blower **180** is driven by an electric motor **186** through a belt drive **187** and is supported along with the motor on a mounting plate **188** on the longitudinal beam **174*a*** of the main framework, and a supplementary beam **189** between transverse beams **76*b***, **76*c***. A pivotally mounted cover **190** over the outlet of the blower **180** controls the efficiency. A duct **192** connects the inlet of the blower **180** with the vacuum changer **182**. A vacuum regulator **194** in the form of an inlet conduit to the vacuum chamber **182** with a baffle **195** biased to a closed position regulates the degree of vacuum that can be maintained in the chamber **182**.

Each intake hood **184**, **185** in part supports the vacuum chamber **182** and is itself supported by channels **78*d***, ***e*** of the subframe **78**. Each intake hood, as best shown in FIGS. 5 and 6, includes two transversely spaced longitudinally extending inlet ducts **196*a***, **196*b***, each with an elongated intake slot **197**. The inlet ducts **196*a***, ***b*** are between upper and lower reaches

of the two belts of each pair of belts **151*a***, ***b*** and **151*c***, ***d***, and the intake slots **197** are located between the belts of each pair slightly above the level of the lower reaches. Lower portions of each inlet duct **196*a***, ***b*** serve as a guide surface for the upper surfaces of the lower reaches of the belts.

When the blower **180** is driven by the motor **186**, the pressure within the vacuum chamber **182** is reduced, thereby reducing the pressure at the elongated slots **197** of each inlet duct **196** of each intake hood. The pressure is reduced to a sufficient degree that the veneer sheets moved by the transfer conveyor **120** to a location directly beneath the belts **151** of the overhead belt conveyor E are held by ambient pressure against the lower reaches of the belts and are then conveyed by virtue of the frictional engagement with the belts, along the path of belt movement into the sorter-stacker apparatus A.

Sheets of veneer moved by the overhead conveyor E are removed from the belts **151** and directed to the leading edge or side aligning mechanism K, K associated with the stacking stations H, H′ by the stripping mechanism L, L′ and kicking mechanism M, M′ at the stacking stations H, H′, respectively, and associated with each pair of belts **151*a***, ***b*** and **151*c***, ***d***. Each stripping mechanism includes two stripper bars **200*a***, **200*b*** that extend longitudinally adjacent the pair of belts, preferably located laterally to the inside of the pair of belts. The end of each stripper bar **200*a***, ***b*** extending toward the incoming veneer sheets is pivoted to a fixed support **201** at a level just above the lower reaches of the belts **151**. Each stripper bar is connected adjacent its opposite end to a fluid actuator **202** which pivots the bar in a vertical plane about the fixed pivot, from a horizontal position above the lower reaches of the belts **151** to an inclined position partially below the belts. The fixed supports **201** are secured to the longitudinal beams **78*d***, ***e*** of the subframe and the fluid actuators **202** are secured to an angle iron crosspiece **204** (FIG. 5) that extends horizontally between the two longitudinal beams **78*d***, ***e***.

Each kicking mechanism (FIGS. 3, 6 and 7) includes two kicker bars **208**, one in each duct **196*a***, ***b*** of each intake hood **184**, **185**, aligned with the associated slot **197** and movable between an upper position within the respective duct **196** and a lower position in which it extends through the slot of the duct to a level lower than the lower reaches of the associated belts **151** of the overhead belt conveyor E. Each kicker bar **208** is supported at opposite ends of a transverse rod **210** that is supported in bearings **211** in the inside wall of each duct **196**. A short, central, upwardly extending operating lever **212** is fixed to the transverse rod **210** and is connected to a piston rod **214** of a fluid actuator **209**. The fluid actuator **209** is located midway between ducts **196*a***, **196*b*** of each intake hood and is attached to a crossbar to **216** extending between the channels **78*d***, ***e*** of the subframe. Actuation of the fluid motor **209** pivots both kicker bars **208** from positions within the ducts **196** to lower positions where they extend below and between the associated pairs of belts **151*a***, ***b*** and $151_{c,}d$.

When a sheet is to be deposited in a particular stacking station, the associated stripper bars **200*a***, ***b*** are first actuated to deflect the leading portion of the veneer sheet downward, at a location where it will be received by the leading edge or side alignment mechanism of the selected stacking station. The kicker bars **208** are then actuated to assure that the trailing edge of the veneer sheet is also removed from the belts **151**. The stripper bars and kickers are then retracted to raised positions above the lower reaches of the belts **151** until another sheet is to be removed from the overhead conveyor at the respective station.

The mechanisms K, K′ at each of the stacking stations for aligning the leading edges of veneer sheets are best shown in FIGS. 3, 5 and 8—15. This mechanism receives the leading edge of a veneer sheet stripped from the overhead conveyor and positively locates the leading edge against a fixed stop before or as the sheet is deposited on a stack of sheets being formed. Basically, the mechanism includes movable members actuated in timed relationship with the veneer stripping mechanism to reciprocate between a forward position and a rearward position. The mechanism clamps a leading portion of a veneer sheet when the mechanism is in a forward position and pulls the sheet in the direction of sheet movement so that the leading edge of the sheet comes in contact with a fixed abutment. Once the leading edge of the sheet is stopped by the abutment, the clamping mechanism slides from the sheet as it continues to move backward beyond the abutment.

In the embodiment shown, the leading edge-aligning mechanism includes two sets of upstanding arms **220**, **220'** (see FIGS. **8** and **9**) pivotable about a common axis that extends transversely of and below the path of veneer sheet travel. Each set **220**, **220'** includes three arms spaced transversely of the path of travel so that one arm **220*a*** of set **220** is located centrally of the leading edge of each sheet of veneer and the other two arms **220*b***, *c* are located one adjacent each side of the veneer sheet. The three arms **220'** of the other set are similarly spaced and are side by side with the arms of the first set. The arms of each set are secured together so that they pivot as a unit and grip a veneer sheet at three spaced locations across the leading edge of the sheet to provide adequate support and to minimize any tendency to tear the sheet as it is being aligned. The three arms of each set are actuated by a single fluid actuator connected to the center arm and each set is operated alternately as successive veneer sheets are stripped from the overhead conveyor over the stacking station so that each set positions alternate sheets to being stacked. Alternatively, a single set of arms can be used to align each sheet, the construction and operation being essentially identical except that the set of arms cycles more frequently. The operation of a single set of arms as well as a double set is described in detail subsequently in connection with the control circuit and operation.

The supporting structures **82**, **83** for the leading edge or side aligning mechanisms K, K' are different due to the different location of the arms in the stacking stations to accommodate the different size of veneer sheet to be stacked. The edge-aligning mechanisms themselves of each stacking station are identical and each arm of each mechanism is similarly constructed and therefore only one arm **220*a*** will be described in detail.

The arm **220*a***, as best shown in FIGS. **8** and **9**, is formed of two spaced flat side members **226**, **227**. Each side member is elongated and has an enlarged portion for supporting a movable sheet gripping device **228**. The lower ends of the side members **226**, **227** are supported by a transverse shaft **230** for rocking movement in a vertical plane. As shown in FIGS. **5** and **8**, the transverse shaft **230** is secured at opposite ends in bearings **231**, **232** on mounting plates **234**, **235** supported by angle iron members **237**, **238** across transverse channel beams **240**, **241** supported by frame uprights **72*b*** and gussets **84**.

The lower end of the arm **220*a*** is fixed relative to the supporting shaft **230**, whereas the corresponding arm **220*a*'** of the other set of arms is rotatable relative to the shaft **230**. The other arms **220*b*** and **220*c*** of the first set are similarly fixed to the shaft **230** whereas the corresponding arms **220*b*'** and **220*c*'** are freely pivotable on the shaft **230** and are connected to the arm **220*a*'** by a partial sleeve shaft **244** concentric with and partially surrounding the shaft **230**.

The arm **220*a***, being the center arm of the set of arms **220*a***, ***b***, ***c***, is connected to a piston rod **246** of an arm actuator **248**. The lower end of the actuator **248** is pivotally secured to the transverse support **82** by a bracket **249** and the piston **246** is pivotally secured between the side members **226**, **227** by a pin **250** that is mounted in the side members and that extends through an end piece **251** threadedly secured to the piston rod **246**.

The movable sheet gripping mechanism **228** at the upper end of the arm **220*a*** includes a lower jaw **254** and an upper jaw **255** which is movable to grip the leading edge of the veneer sheet against the lower jaw **254**. The lower jaw **254** is an elongated, resilient, slightly curved member with a flat tongue-like front portion **254*a*** and laterally spaced rear portions **254*b***, *c* (FIG. **15**) that provide a slot or open portion **257** to receive the operating and supporting mechanism of the upper jaw. Depending support pieces **258**, **295** are fixed to the rear of each elongated spaced portion **254*b***, *c* and straddle an upper portion of the arm **220*a***. The support pieces **258**, **259** are pivotally secured to the arm **220*a*** by a pin **260**. A stop **262** extends from the outer surface of the side member **226** and engages a stop surface of the depending support piece **258** to limit pivoting of the lower jaw **254** about the pin **260** in a counterclockwise direction in the orientation of FIG. **9**. A vertical biasing rod and spring assembly **264** on each side of the arm **220*a***, secured to each side member **226**, **227**, biases the lower jaw **254** in a counterclockwise direction about the pivot pin **260**. For this purpose, the lower jaw **254** includes two laterally extending ears **265**, **266**, each of which engages the upper end of a spring biased rod **268** of the biasing assemblies **264**.

A cam follower roller **270** (FIGS. **15** and **16**) is secured to the elongated back portion **254*c*** of the lower jaw by a mounting plate **272** for following a lower cam surface **274** of a fixed cam plate **275** above the lower jaw during forward rocking movement of the arm **220*a*** so that the lower jaw **254** is forced downward against the bias of rods **268**, from the upper phantom position shown in FIG. **14** to the solid line position. As a result, the jaw will tend to move upward under the bias of rods **268** and clamp an engaged sheet during backward movement of the arm.

A fitting **276** (FIG. **9**) is provided on the support piece **258** at the rear of the jaw to couple a hose **277** to a passageway through the lower jaw that has an orifice (not shown) adjacent the front end **254*a*** for emitting a flow of air under pressure to provide a cushion for a sheet of veneer being gripped and aligned by the jaws.

As shown in FIG. **8**, the adjacent arm **220*a*'** in the corresponding position to the arm **220*a*** has a corresponding cam follower **270'** on the opposite side of the arm from the cam follower **270**. This is typical of the other pairs of adjacent arms. The arm **220*a*'** is supported for rotation about the shaft **230** so that it is not affected by rotation of the shaft **230** that operates the arms **220*a***, *b*, *c*. A fluid actuator **295** is pivotally supported at its lower end to a bracket **296**, which along with the bracket **249** of actuator **248**, is secured to a central crossbeam **298** between the transverse channel beams **240**, **241** of the transverse support **82**. The fluid actuator **295** has an upwardly extending piston rod **300** threadedly connected at its upper end to a pivot block **302**, which serves to pivot the arms **220*a*'**, ***b*'**, ***c*'**.

When arms **220** are in a forward position as shown in FIG. **9**, the jaws **254**, **255** extend through openings **300** in a transverse, horizontally extending abutment **302**, which is comprised of a flanged support plate **303** and a flat abutment plate **304** secured to the forward side of the plate **303** as by welds. The plate **304** has a radiused lower edge **304*a***. Vertical positions **306**, **307** (see FIGS. **5** and **8**) support the plate **303** at opposite ends. The cams **275** extend rearwardly from the flanged support plate **303** directly above the cam follower rollers **270** or **270'**. As shown in FIG. **8**, the cams **275** are located on opposite sides of each pair of openings **300** associated with the pairs of arms of each set. Brackets **309** support the cams and each bracket has a vertical slot **310** (FIG. **14**) to adjustably receive a bolt **311** and nut **312** that clamp the cam to the bracket.

The manner in which each individual arm and the associated jaws operate is best understood from FIGS. **10** to **13**. In the preferred embodiment, three arms work in unison. As shown in FIG. **10** an arm **220** is in a forward position to receive a sheet S of veneer stripped from the overhead conveyor and guided to the open jaws of the arm by the stripper bar **200**. With the arm **220** in the forward position, the cam **275** has urged the cam follower **270** from an initial higher position shown in phantom to a lower position corresponding to the solid line position shown in FIG. **14**, against the bias of the biasing assemblies **264**. The upper jaw **255** is in a rearward raised position by virtue of the extended piston rod **289** of the fluid actuator 290. The arm 220 is maintained in the forward position by the fluid actuator 248.

Actuation of the fluid actuator 290 to withdraw the piston rod 289 pivots the link 283 to move the upper jaw 255 forward and downward to a closed position to grip a veneer sheet between the upper and lower jaws. The downward movement of the upper jaw 255 moves the lower jaw further downward after the veneer sheet is gripped, against the biasing force of the assemblies 264, to the lower phantom position in FIG. 14. This assures that the engaged edge of the sheet S is firmly clamped and also limits the clamping pressure on the veneer to the biasing force.

As shown in FIG. 12, the arm 220 is then pivoted from the forward position to the rearward position by actuation of the fluid actuator 248, which retracts the piston rod 246. The jaws 254, 255 are maintained closed by the actuator 290. As the arm 220 is pivoted to the rearward position shown in FIG. 12, the leading edge of the sheet S is drawn into contact with the flat abutment plate 304 and is "wiped" from the jaws. Typically, three arms grip the sheet across its width, assuring that the entire leading edge of the sheet abuts the plate. Once the arms 220 pivot so that the front ends of the jaws 254, 255 are behind the front surface of the plate 304, the sheet S is free to drop to a stack of sheets, directly below.

As shown in FIG. 13, the upper jaw 255 is then raised by the fluid actuator 290, allowing the biasing assemblies 264 to pivot the lower jaw 254 to an upper position, which is limited by the stop member 262. The arm 220 is maintained in this rearward position until a subsequent sheet S is to be engaged and aligned. In the preferred embodiment, alternate sets of arms engage and align alternate sheets S to be positioned on the associated stack.

As sheets of veneer are stacked at each of the stacking stations, the ends of the sheets, which extend parallel to the direction of sheet movement, are periodically contacted and pushed into predetermined alignment by movable end-aligning devices 300*a*, 300*b* (see FIG. 5) on opposite sides of the conveying path. The aligning device 300*a* on one side of the path includes a stack-height sensing mechanism that controls the lowering of the respective vertically movable stack support N, N'. In all other respects, the devices 300*a*, 300*b* are the same, and only the device 300*a* will be described in detail.

The aligning device 300*a* includes a flat plate 315 (FIGS. 5, 16 and 17) that extends vertically in a plane parallel to the path of sheet movement through the sorter-stacker apparatus. The plate 315 is supported by a rearwardly extending rod 316 threadedly received in a boss 317 of a support bracket 318. The support bracket 318 depends from and is pivotally supported by a longitudinally extending support bar 321 of the veneer accumulator 320 at the stacking station. A fluid actuator 322 is pivotally secured at an upper end to the framework of the sorter-stacker apparatus by a bracket 324 depending from the longitudinal top beam 74*a*. The fluid actuator is inclined downwardly and inwardly, and has a piston rod 326 pivotally secured to the rear of the bracket 318. When the fluid actuator 322 is energized to extend the rod 326, the bracket 318 is pivoted inwardly toward the ends of the veneer sheets that are supported on the lift support mechanism N.

As shown in FIG. 17, the plate 315 of the aligning device 300*a* has a central slot 328 opening through a bottom edge 329 of the plate. A movable sensing finger 330 is pivotally supported behind the plate 315 by a bracket 332 carried by the rod 316. The sensing finger 330 has a flat, front abutment surface 330*a* generally parallel to the plate 315 when extending through the slot 328, rearwardly extending upper portion 330*b* and a rearwardly extending lower portion 330*c*. The upper portion 330*b* is longer than the lower portion 330*c* and has two upstanding arms 334, 335 that straddle the rod 316 and are secured by a bolt 336 and nut 337 associated with the bracket 332. The lower portion 330*c* is adjacent to but terminates short of a proximity switch 338 when the finger 330 is in the forward position shown in FIG. 16. The proximity switch 338 is supported on a depending bracket 339 secured to a mounting plate 340 extending rearwardly from the plate 315. A tension spring 342 is secured at one end to a transverse pin 343 that extends between the two arms 334, 335. The spring extends between the two arms toward the plate 315 and is secured at its opposite end to the plate by a headed pin 345 that extends rearwardly through an aperture in the plate 315. The spring 342 biases the finger 330 to the forward position shown in FIG. 16 where it will contact the top veneer sheet of the supported stack when the stack reaches the height of the lower portion 330*c* of the finger. Forward movement is limited by a stop 346. The lower portion 330*c* is spaced substantially upward from the lower edge 329 of the plate 315 so that a substantial number of sheets S are stacked before the finger 330 is actuated. When the stack of sheets reaches the level shown in FIG. 16, movement of the end aligning device 300*a* toward the stack results in the finger 330 contacting the end of the uppermost sheet S and being moved against the biasing force of the spring 342 to a rearward position in which the lower part 330*c* of the finger is moved opposite the proximity switch 338. This produces an electrical signal in a control circuit, indicating that the stack height has reached a predetermined level and in response to the signal the lift support N is lowered a predetermined amount so that the top sheet of the stack is substantially below the lower part 330*c* of the finger 330 but just above or opposite the lower edge 329 of the plate 315. This assures that the next sheet deposited on the stack will be in a position to be engaged by the plate 315 and, at the same time, the distance that any sheet must fall to the top of the stack or to the lift support N is kept relatively small.

At each loading station a vertically movable lift support, indicated as N, N' with respect to the corresponding loading stations H, H', is provided and upon which the stacks of sheets S are formed. Until the stack of sheets on the support reaches a predetermined height, the support is in an upper position, as shown in connection with loading station H' in FIGS. 2 and 3, beneath but adjacent to the overhead conveyor E. The lift support is jogged downward as sheets are stacked, under the control of the end aligning device 300*a*, as already described. When the lift support is lowered to a predetermined level, a limit switch is actuated indicating that a stack of predetermined height has been formed, and the support is automatically lowered to a bottom position, as shown in conjunction with loading station H in FIGS. 2 and 3, to deposit the stack on the takeoff conveyor D.

The construction of the lift supports N, N' is best shown in FIGS. 3 and 5, the support N' being shown in a position lowered somewhat from the position shown in FIG. 3 for purposes of illustration. Parts of the frame uprights 72*c* have been broken away to show uprights 72*b*.

Each support N, N' is of the fork type, having cantilevered tines 350 supported by a transverse crossbar 352 and extending from the crossbar in the direction of travel of the takeoff conveyor D. The crossbar 352 is supported at opposite ends by vertical guide plates 354, 355 that slide in a vertical passageway between back-to-back channel members forming the uprights 72*b*. Lower rollers 357 and upper rollers 358 extend from opposite sides of each plate 354, 355 and ride on back and front surfaces of the upright 72*b*, as shown in FIG. 3, to guide the plates 354, 355 along the uprights. A separate cable 360 is secured by a connector 361 to the upper portion of each plate 354, 355 and is trained about fixed pulleys 362 (FIGS. 3 and 4) on the associated transverse horizontal beam 76*b*, 76*a* and about movable pulleys 364 carried at the ends of piston rods 366 of fluid actuators 368 that extend along the uprights 72*a*, 72*b* on opposite sides of the frame. The other end of each cable is fixed to the frame and with this arrangement actuation of the fluid actuators 368 to extend to the piston rods 366 raises the movable pulleys 364 and lowers the lift-support 42.

During transfer of an accumulated stack of veneer sheets to the takeoff conveyor D and return of the lift support to its up position, successive veneer sheets stripped from the overhead belt conveyor E are caught by veneer accumulators 320*a*, *b* on opposite sides of the path of travel at each loading station, and are then deposited on the respective lift support when it is returned to the raised position. A veneer accumulator is provided along each side of the path of sheet travel to support opposite ends of the sheets at the approximate position at which they are initially received by the lift supports. Each veneer accumulator is of similar construction and includes two bent arms **370**, spaced longitudinally of the path of travel of the veneer sheets. The arms are fixed to and depend from the overhead longitudinal shaft **320**. Distal ends of the bent arms extend inwardly and are connected by a longitudinally extending rod **372** that serves as a support for one end of the sheets S, as shown in FIGS. 3 and 5.

A fluid actuator **374** actuates each veneer accumulator through a crank arm **376** at one end of the support shaft **320** to which a piston rod **378** of the actuator is connected. Normally, the piston rod **378** is extended to maintain the arms **370** in retracted position, as indicated in phantom in FIG. 4 and sheets are supported by the lift support. The piston rod **378** is retracted when the lift support is lowered to transfer a stack of sheets to the conveyor D, and the arms **370** swing inward to position the rods **372** beneath the ends of sheets stripped from the overhead conveyor. The arms **370** are retracted when the lift support is returned to the upper position and the accumulated sheets are deposited on the lift support.

A modified construction of sheet stripper mechanism for removing sheets from the overhead conveyor E and sheet leading edge or side aligning mechanism is shown in FIGS. **18** and **19**, which are fragmentary views corresponding to portions of FIGS. 3 and 5, as substitutes or replacements for the stripper, kicker and leading side-aligning mechanisms L, M and K, respectively, at the second stacking station H' of the preferred embodiment. That is, in the embodiment shown in FIGS. **18** and **19** the stripper, kicker and front or leading edge-aligning mechanisms at stacking station H' of the preferred embodiment are omitted and replaced by stripper and leading or side aligning mechanisms designated generally V and W respectively. The other parts of the apparatus remain the same and are designated in FIGS. **18** and **19** by the same reference characters previously employed.

In the stripper mechanism V shown in FIGS. **18** and **19** each of the stripper bars **200***a*, *b* is supported and moved in the same manner and only the supporting mechanism for the bar **200***b* is herein described in detail. The duplicate parts of the supporting mechanism for the bar **200***a* are designated by the same reference characters with the letter *a* added. The bar **200***b* is carried by links **500**, **502** pivotally connected to the upstream and downstream ends thereof, respectively. The links **500**, **502** are inclined upwardly in a downstream direction and the downstream ends thereof are fixed to shafts **504**, **506**, respectively, extending transversely of the length of the conveyor E and rotatably supported in suitable bearing members fixed to the longitudinally extending frame members **78***e*, *f*. The stripper bars are normally held above the path of travel of veneer conveyed by conveyor E and are lowered, under control of the sheet selecting sensing equipment of the preferred embodiment, to push and strip a sheet from the conveyor E by a double acting reciprocating type fluid pressure motor **508**. The cylinder member of the motor **508** is pivotally connected to a cross frame member extending between the frame members **78***e*, *f* and the projecting end of the piston rod that is pivotally connected to an upstanding lever **510** fixed to the shaft **506**.

The leading edge aligning mechanism W comprises duplicate assemblies **512***a*, **512***b* located below and for the most part downstream from the downstream ends of the stripper bars **200***a*, **200***b*, respectively, and supported or transversely extending from channel members **214**, **216** connected to opposite sides of the upright frame members **72***c*. Each of the assemblies **512***a*, **512***b* are alike and only the assembly **512***b* will be described in detail. The duplicate parts of assembly **512***a* will be designated by the same reference characters with the latter *a* added thereto. The assembly **512***b* comprises a pair of angle members **518**, **519** welded to the top of the frame members **214**, **216** and projecting in an upstream direction to the abutment member or plate **312** which in this instance is welded to and carried by the angle members. The assembly **512***a* includes a member **520** slidable supported in a member **522**, preferably connected to the upper ends of a plurality of links **524**, **525** the lower ends of which are preferably connected to the angle members **518**, **519**. The member **522** is biased by a spring **526** towards the upstream end of the apparatus and is normally held in engagement with the downstream side of the abutment plate **302**. The member **520** projects through a slot in the abutment member **302** in a manner generally similar to that in which the gripping device of the leading edge alignment mechanism of the preferred embodiment projects through a slot in the abutment member, and is biased in an upstream direction by a spring **530** interposed between its downstream end and a stop or abutment at the downstream end of the member **522**. Movement of the member **520** in an upstream direction is limited by a stop **532** projecting upwardly therefrom intermediate its ends and which stop spans the slot in the abutment plate or member **302** through which the forward end of the member **520** projects.

When a sheet of veneer carried by the overhead conveyor E is to be stacked in the stacking station H', the motor **508** is actuated when a leading edge of the veneer reaches a position approximately at the downstream end of the stripper members **200***a*, **200***b* to kick or strip the sheet of veneer off of the conveyor. As the sheet of veneer falls, the leading side of the sheet strikes the top of the movable members **520**, **520***a* projecting forwardly of the abutment plate **302**. As the stripper bars continue to move downwardly, the leading edge of the veneer sheet is clamped between the downstream ends of the stripper bars and the projecting ends of the members **520**, **520***a* in a downstream direction therewith. When the leading side of the veneer strikes the abutment plate **302**, continued movement of the stripper bars **200***a*, **200***b* causes the leading ends thereof to pass through the slots in the abutment plate and engage the stops **532**, **532***a* and retract or move the projecting end of the members **520**, **520***a* to a position downstream of the abutment plate **302**, allowing the veneer sheet to drop onto the stack. The motor **508** is then reversed and the stripping and leading edge alignment mechanisms return to their original positions.

During the alignment of the leading edge of the veneer sheet, the trailing portion of the sheet is preferably supported by a stream of air in a manner similar to that in which it is supported in the preferred embodiment. The mechanism for doing this, however, is not shown in FIGS. **18** and **19**.

A diagrammatic view of the apparatus is shown in FIG. **20** illustrating the location of the principal control elements. The operation will be explained briefly in conjunction with the basic control elements and thereafter in more detail in connection with the control circuit.

Veneer sheets are advanced from the infeed conveyor C to the underside of the overhead belt conveyor E and then moved across stacking stations. As each veneer sheet passes over the first stacking station, two photoelectric cells spaced transversely across the path of travel, one of which is shown at PE–1 in FIG. 20 and both of which control an associated photorelay, detect the presence of the sheet. As the sheet continues to move across the stacking station the presence is again detected farther downstream by one or both of two photoelectric cells spaced across the path, one of which is shown PE–2 in FIG. 2. If a second photoelectric cell PE–2 detects the sheet of veneer while it is also present beneath a first photoelectric cell PE–1, the sheet is of a large size which is to be stacked in the second stacking station and the relay associated with the photoelectric cells PE–2 is not energized and the sheet is not stripped from the conveyor. If the sheet is of the smaller size to be stacked in the first stacking station, it will have moved beyond the photoelectric cells PE–1 by the time it is beneath cells PE–2 and under these conditions the relay associated with cells PE–2 is energized. This has the effect of actuating the stripping mechanism to strip the leading edge of the veneer from the overhead conveyor and energizing the kicking mechanism to assure that the trailing end of the sheet is removed from the conveyor. The stripper and kicker mechanisms return to their original positions after a timed delay. The forwardly positioned arms of the two sets of aligning arms **220, 220'** now begin the leading edge aligning process.

At the beginning of the edge-aligning process an air blast is emitted from the lower jaw of the forward aligning arm to provide an air cushion beneath the sheet descending from the overhead conveyor. The upper jaw is actuated to a closed position to grip the leading edge of the stripped sheet. The closing of the jaw and the reverse movement of the forward arm B is under the control of a timer, so that the jaw first closes and thereafter the arm is moved to a retracted position, the veneer leading edge is drawn against the stop member or abutment **302**. The arm continues its rearward movement and the veneer is forced to slide from the jaw by the abutment. The sheet then falls to the lift support **301***a* to form a stack in which each sheet of veneer is aligned to its leading edge. When the arm B reaches the retracted position, it actuates switch **1**LS–B causing the upper jaw member to open and completing one cycle of the edge alignment by arm B. The cycling of the arm A is identical and each time arm A cycles, the end aligning devices **300** on each side of the stack of veneer are actuated to center the sheets end-wise. The aligning arm A is moved to the forward position to receive the next sheet when the kicker mechanism is energized by the photoelectric cells.

Veneer not stripped from the overhead belt conveyor E and deposited in the first stacking station carried along by the conveyor until it reaches the second stacking station where its presence is detected by one of two photoelectric cells spaced across the path of travel, one of which is I indicated at PE–3 in FIG. 20. This energizes an associated photoelectric relay and causes the stripping and kicker mechanism at the second stacking station to operate, all in the manner as previously described in connection with the first stacking station.

The lift supports **301** upon which the sheets of veneer are stacked are each jogged down as the respective stack increases in height, as already described in connection with the end-aligning apparatus **300***a*. As each lift support **301** is lowered to a predetermined position, it contacts a limit switch 2LS–L1 or 2LS–L2 on the upright supports **72***a*, **72***b*. When these limit switches are tripped, the respective lift support is lowered, provided two photoelectric cells PE–4 and associated relays at the input end of the sorter-stacker apparatus indicate that enough of a gap exists between incoming sheets to permit the stack to be lowered and the veneer accumulators to be moved into position. When the lift support is lowered, the accumulator arms **370** are moved inwardly by the associated fluid actuators **374** to receive veneer sheets stripped from the overhead conveyor E while the lift support lowers a completed stack onto the takeoff conveyor D and returns to its uppermost position.

The lowered stack of sheets trips a limit switch 4LS–L1 or 4LS–L2 when it reaches the takeoff conveyor D, starting the conveyor to move the stack out of the loading stations and into a position at the discharge end of the apparatus, where the stack is subsequently removed. A limit switch 1LS–CV at the discharge end of the conveyor is actuated by the stack of sheets to stop the conveyor D when the stack reaches the end of the conveyor. Release of the switch 4LS–L1 or 4LS–L2 as the stack is moved out of the loading station causes the fluid actuators **368** to raise the unloaded lift support until it reaches an upper position, where it trips a limit switch 1LS–L1 or 1LS–L2 to stop the upward movement and to pivot the veneer accumulator arms to a rearward position and deposit accumulated sheets on the lift support.

Electrical schematic wiring diagrams are shown in FIGS. **21** to **28** showing a control circuit for the apparatus and the description of the operation will refer to these figures. In the circuits, line index numbers are provided along the left-hand side of the circuit for identification and are referred to in the description. Contacts controlled by relays or solenoids are identified by reference characters corresponding to the controlling relay or solenoid. The function of the control element is set forth along the right-hand side of the diagram along with the line index numbers in which contacts controlled by the elements are located. Where the indicated line index number at the right-hand side is underlined, the contact in the line indicated is normally closed. Otherwise, the associated contact is normally open.

With power to the control circuit, the apparatus is ready for startup. The blower motor **186** (MTR **1** in the diagram) is started by depressing the blower motor start pushbutton **2PB** (line **3**). This energized motor control relay **1M**, operating the associated contacts and lighting the light **1LT** indicating that the blower motor is running. A hydraulic tank motor **MTR 2** is started by depressing a hydraulic tank start push button **4PB** (line **5**) energizing motor control relay **2M** and operating the associated contacts. A light **2LT** is turned on and a master relay CRM (line **7**) is energized, closing the normally open CRM contacts in circuit connecting lines LA and LB and energizing the control circuit. With the master relay CRM energized, the belt motor **147** (MTR **3** in the diagram) is started by depressing the belt motor start push button **6PB** (line **8**), energizing the control relay **3M** and actuating the associating contacts, lighting light **3LT** indicating that the belt motor is running. A hand-auto switch **1SS** (line **12**) is switched to the auto position, energizing the autocontrol relay **30CR** and setting the machine for automatic operation.

The operation at stacking station H will now be described.

With the belt motor running, veneer sheets are transferred from the clipper to the vacuum stacker apparatus and moved across the stacking stations.

As sheets of veneer pass over the station H, a photoelectric cell **PE–1** detects the veneer, energizing the associated photoelectric relay **01** (line **16**), which has normally closed contacts (not shown) that open and break the initiating circuit to the photoelectric relay **02** (line **17**) associated with photocells **PE–2**. As the veneer continues to travel, a photoelectric cell **PE–2** will detect the veneer and energize a photoelectric relay **02** one shot logic module. The one shot logic module associated with the photoelectric relay **02** operates in such a way that when signalled by an associated photoelectric cell PE–2 that veneer is present, a momentary output to the photorelay is obtained thereby pulsing the relay. Reset of the logic module occurs when the veneer passes beyond the eye and no veneer is detected. If both a photoelectric cell PE–1 and a photoelectric cell PE–2 indicate that veneer is present, then the initiating circuit to photoelectric relay **02** from the associated one shot logic module (through the normally closed now open contacts of photoelectric relay **01** to photoelectric relay **02**) will be open and photoelectric relay **02** will not be energized and veneer will pass on to stacking station H'. If no veneer is detected by the photoelectric cells **PE–1** and if veneer is detected by the photoelectric cells **PE–2**, then the photoelectric relay **02** will be energized by the photoelectric relay **02** one shot logic module.

When photoelectric relay **02** contacts (line **19**) close, the cycle relay **1CR** (line **19**) is momentarily energized and its contacts then momentarily close, energizing four stacking station H circuits: cycle auxiliary circuit, cycle memory, cycle memory arm A air-on circuit and arm B air-on circuit.

Cycle auxiliary relay **2CR** (line **22**) when energized, sets up a holding circuit through normally closed, timed to open, contacts of a stripper-down timer **1TR** (line **25**) and though contacts **2CR** (line **23**), and contacts **LCR** (line **22**). Normally closed contacts **2CR** (line **23**) associated with the timer **1TR** initiate the stripper-down timer operation to start the timing cycle. Simultaneously, **2CR** contacts (line **27**) energize a stripper-down solenoid **1PA**, causing the stripper bars to move down and strip the veneer leading edge from the overhead conveyor belts. When the stripper-down timer **1TR** times out, relay **2CR** is deenergized, breaking the holding circuit and allowing the stripper to return to the up position. Simultaneously as the stripper is energized to go down, the kicker solenoid (either solenoid 2PA—line 36 or 2PB—line 38 depending upon which solenoid is selected by a flip-flop relay 4CR) is energized by contacts 2CR (lines 36 and 38) closing. The kicker kicks the remainder of the veneer sheet free from the belts.

The cycle memory circuit consists of a logic unit 3CR (lines 29 to 33), a flip-flop 4CR and a kick relay 5CR (line 35). When the cycle relay 1CR is energized, 1CR normally open contacts in line 29 close and 1CR normally closed contacts in line 30 open. The purpose of the logic unit 3CR is to make certain that there is no electric overlap of the 1CR normally open and normally closed contacts in lines 29 and 30; that is, to prevent a line LG from line 29 and a line LH from 30 from carrying current at the same time. Each time the cycle relay 1CR is energized, the flip-flop relay 4CR will be energized and the 4CR contacts (line 35) that control the kick relay 5CR will alternate their state (closed or open) each time a sheet of veneer is to be deposited into stacking station H.

Depending upon which set of arms of the edge aligning mechanism 38 associated with the stacking station is in a returned position, tripping the limit switch 1LS–A (Arm A) or 1LS–B (Arm B), the opposite set of arms will begin the edge aligning process. In the conditions shown in the electrical schematic diagram, diagrammatic arm B as indicated in FIG. 18 is in the forward position and arm A is in the returned position. Therefore, when 1CR contacts (line 59) momentarily close, an air-on relay 8CR is energized and creates a holding circuit via its own normally opened, now closed, contacts (line 60). Also at this time, the arm B air-on solenoid 6PA (line 61) is energized, turning the air blast on to provide a cushion of air for the veneer sheet to ride on while the front edge is being aligned.

Relay 8CR also energizes the arm B jaw-close timer 5TR (line 63) and the arm B-reverse timer 6TR (line 66) to start their timing cycles. The timing sequence is set so that the jaw-close timer 5TR delay is shorter than the arm-reverse timer 6TR delay. The result is that timer 5TR times out and its normally open contacts close, energizing the arm B jaw-close solenoid 7PA, closing the jaw, which then grips the leading edge of the veneer sheet. Then arm B-reverse timer 6TR times out, closing its normally open contacts and energizes the arm B-reverse solenoid 8PA, allowing the arm to return. As the arm is returning, the veneer leading edge is drawn against the abutment 302. The arm continues to return and the veneer is forced to slide from the jaws by the abutment. In this manner the veneer stack is built up, with each sheet of veneer aligned to its leading edge. When arm B is returned, tripping arm B-return limit switch 1LS–B, the arm B-return relay 9CR (line 70) is energized. NOrmally open contacts 9CR close, energizing the jaw-open solenoid 7PB (line 71), opening the jaw and completing one cycle of edge aligning by the arm B.

If, in stacker station H, arms A and B are in a position that is opposite from that shown in FIG. 20, that is, if arm A is forward and arm B is returned, then arm A will cycle in the same manner as described above in connection with arm B. Each time arm A returns to the return position, the arm A return limit switch 1LS–A is tripped. When 1LS–A is tripped, arm A-return relay 7CR (line 52) is energized and the associated contacts close and energize logic relay 10CR (line 77). Normally closed contacts 10CR (line 79) then open and normally opened contacts 10CR (line 81) close. When the normally closed contacts 10CR open, the stacker station H end-align-in timer 8TR begins its timing cycle. At the same time, normally open, now closed, contacts 10CR energize the end-align-in solenoid 9PA (line 81) through the normally closed, timed open, contacts of 8TR and allow the end aligners 40 to come in and center, end-wise, the veneer sheet that has been deposited on the stack. When the end-align-in timer 8TR times out, its normally closed contacts will open, deenergizing solenoid 9PA and allowing the end aligner to return to the out or clear position completing the end aligning cycle. Reset of 8TR occurs when arm A GOES forward, releasing limit switch 1LS–A (line 52), deenergizing relays 7CR, 10CR and 8TR.

Each time the stacker station H kick relay 5CR is energized, the arm A or arm B of the bin will be energized to go to the forward position. As shown diagrammatically in FIG. 18, arm A is in a returned position and arm B is in the forward position. Therefore, when 5CR contacts close, arm *a* forward timer 4TR (line 55) is energized to begin its timing cycle and, when timed out, its normally open, timed close, contacts close and energize arm A forward solenoid 5PB (line 57), sending arm A forward, provided arm A is returned. If arms A and B are in a position that is opposite from that shown, that is, if arm A is forward and arm B is returned, then arm B will cycle in the same manner as described above for arm A.

Veneer that is not dropped into stacker station H continues through the sorter stacker apparatus to stacker station H', and the operation at H' will now be described in connection with the alternative construction of a single set of aligning arms, as shown diagrammatically in FIG. 18. The veneer continues to travel over stacker station H' until a photoelectric cell PE3 associated with photoelectric relay 03 (line 83) detects the veneer leading edge and energized the photoelectric relay 03 to close its normally open contacts (not shown). When the photoelectric relay contacts close, cycle relay 11CR (line 85) is energized and its contacts close, energizing three circuits: a cycle auxiliary circuit, a cycle memory circuit and an air-on circuit.

The energization of relay 11 energizes cycle auxiliary relay 12CR, setting up the holding circuit through normally closed, timed to open, contacts (not shown) of stripper-down timer 9TR (line 91). Normally closed, now open, contacts 12CR (line 89) energize the stripper down timer 9TR to start its timing cycle. Simultaneously, normally open, now closed, contacts 12CR (line 93) energize a stripper down solenoid 10PA, allowing the stripper to come down and strip the veneer leading edge off the overhead belts. When the stripper-down timer 9TR times out, relay 12CR is deenergized, breaking the holding circuit and allowing the stripper to return to the up position. Simultaneously, as the stripper is energized to go down, the kicker solenoid (either solenoid 11PA (line 100) or solenoid 11PB (line 102) depending upon which solenoid is selected by a flip-flop relay 14CR) is energized by contacts 12CR (lines 100 and 102) closing. The kicker kicks the remainder of the veneer sheet free from the belts.

The cycle memory circuit consists of a logic unit 13CR (lines 95 and 96) and the flip-flop relay 14CR. When cycle relay 11CR is energized, normally open contacts 11CR (line 95) close and normally closed contacts 11CR (line 96) open. The purpose of the logic unit 13CR is to make certain there is no electrical overlap of the normally open and normally closed contacts 11CR, i.e., to prevent lines 95 and 96 from conducting at the same time. Each time the cycle relay 11CR is energized, the flip-flop relay 14CR will be energized and the contacts 14CR (line 102) that control kick solenoid 11PB will alternate their state each time a sheet of veneer is to be deposited at stacking station H'. Thus, the kick operation will alternate between solenoids 11PA and 11PB.

An air-on relay 15CR (line 104) is energized by cycle relay 11CR contacts closing. Relay 15CR then sets up a holding circuit by its own normally open, now closed contacts (line 105). Also at this time, normally open contacts 15CR (line 106) close, energizing the air-on solenoid 12PA turning the air blast on to provide a cushion of air for the veneer sheet to ride on while the edges are being aligned.

The energization of relay 15CR causes normally open contacts (line 108) to close, energizing a jaw-close timer 10TR, and also closes normally open contacts (line 111) of an arm-reverse timer 11TR to start the timing cycles. The timing sequence is set so that the jaw-close timer 10TR delay is shorter than the arm-reverse timer 11TR delay. The result is that timer 10TR times out and its normally open contacts close, energizing a jaw close solenoid 13PA (line 110) which closes the jaw of the aligning arm to grip the leading edge of the veneer sheet. Then the arm reverse timer 11TR times out, closing its normally open contacts and energizes an arm-reverse solenoid 14PA (line 113) allowing the arm to return. As the arm is returning, the leading edge of the veneer is drawn against the fixed abutment of the edge aligning mechanism. The arm continues to return and the veneer is removed from the jaws of the arm by the abutment. In this manner, the veneer stack is built up with each sheet of veneer aligned to its leading edge.

When the aligning arm reaches the return position, the arm return limit switch 2LS is tripped. Normally open contacts (line 115) of the limit switch 2LS close, energizing the arm return relay 16CR, whose contacts close and energize a jaw open solenoid 13PB (line 116) allowing the jaw to open. NOrmally open, now closed, contacts 16CR (line 118) also energize an arm forward solenoid 14PB, sending the arm to the forward position, completing one cycle of edge aligning by the arm. Each time the arm reaches the returned position, normally open contacts 16CR (line 121) are closed and energize an end aligning relay 17CR. Relay 17CR then sets up a holding circuit by its own normally open, now closed, contacts (line 122) and through normally closed, timed to open, contacts of an end-align-in timer 12TR (line 124). Normally closed, now open, contacts 17CR (line 123) energize the end-align-in timer to begin its timing cycle. Normally open, now closed, contacts 17CR (line 126) also energize an end-align-in solenoid 15PA, allowing the end aligner to come in and center, endwise, the veneer sheet that has been deposited on the stack. When the end-align timer 12TR times out, its normally closed contacts will open, breaking the holding circuit to relay 17CR and deenergizing the end-align-in solenoid 15PA allowing the end align mechanism to return to the out or clear position, completing the end aligning cycle.

To assure that the stack of sheets does not interfere with the incoming sheets of veneer and to be certain that the incoming sheets are properly stacked, the top of the veneer stack must be maintained within specified limits from the bottom of the belts 151. Control of this distance is accomplished by the operation of the lift support 42 associated with each stacking station. Each time the end-align cycle and the proximity control sensor 338 detects the distance between the belts and top of the stack in stacking station H to be too small, proximity control relay contacts (line 146) close, energizing a lift lower timer 14TR (line 146) to start its timing cycle and energizing a lower jog solenoid 2HA, lowering the lift. Timer relay 14TR develops a holding circuit through its normally closed, timed to open, and its normally open, instantaneously closed, contacts (line 147). When timer relay 14TR times out, its normally closed, timed, contacts open, breaking the holding circuit to 14TR and deenergizing the lower jog solenoid 2HA, stopping the lift.

As more veneer is deposited and stacked in the station and reaches a height at which the proximity switch is actuated, the lift continues to be jogged down until the lower limit switch 2LS-L1 (line 129) is tripped. When 2LS-L1 is tripped, lower relays 18CR (line 130), 19CR (line 131) and 20CR (line 129) are energized, providing a lift-lower control relay (photoelectric relay 04—line 144) is energized by its photoelectric cells PE-4 (FIG. 18) closing its normally open contacts (line 130) to indicate that the gap between incoming sheets of veneer is wide enough to allow the lift to safely begin its lowering cycle, provided also that the conveyor D is not energized to go forward and provided that station H' lift support is not energized to lower, and provided further that the conveyor stop limit switch 1LS-CV is not tripped, energizing the lower stop relay 32CR (line 174).

When 18CR contacts close, the station H lift-lower solenoid 1HA (line 132) is energized to lower the lift. At the same time, an arms-in timer 13TR (line 134) is energized to begin its timing cycle and, when timed out, an arms-in solenoid 16PB (line 135) is energized, bringing the arms of the veneer accumulators in to receive the incoming veneer while the lift support lowers a completed stack on to the conveyor D. The lift continues down and eventually lowers the stack onto the conveyor, tripping the conveyor loaded limit switch 4LS-L1 (line 148) and lift-lowered limit switch 3LS-L1 (line 137). When 4LS-L1 is tripped, the conveyor D starts forward, transferring the veneer stack out of stacking station H and onto the end of the conveyor. As the stack clears station H, 4LS-L1 is released. The normally closed contacts of this switch then close, energizing the lift-raise relay 21CR (line 137), provided the lift is lowered and has tripped switch 3LS-L1 and provided the conveyor is energized to go forward. Normally open contacts 21CR (line 138) close, setting up a holding circuit to coil relay 21CR and energizing raise-solenoid 1HB (line 139) to raise the lift support. The lift continues to raise until the lift-raise limit switch 1LS-L1 (line 141) is tripped, energizing the lift-raised relay 22CR, breaking the holding circuit to coil relay 21CR, stopping the lift and energizing the arms-out solenoid 16PA to bring the arms of the veneer accumulators out, completing one cycle of the lift operation.

The lift support and accumulators of stacking station H' work in the same manner as described above in connection with station H.

When a veneer stack has been lowered onto the conveyor D, tripping either the limit switch 4LS-L2 energizing conveyor loaded relay 24CR (line 149), the relays 23CR and 24CR will be energized, provided the conveyor stop limit switch 1LS-CV is not tripped by a veneer stack being present at the conveyor unload end. When 23CR and 24CR contacts close, 23CR normally open, now closed, contacts (line 150) set up a holding circuit through limit switch 1LS-CV. Contacts 24CR (line 151) energize conveyor motor starter 4M, starting the conveyor D forward. The conveyor continues forward, moving the veneer stack to the conveyor unload end. When the stack reaches the conveyor unload end, the conveyor stop limit switch 1LS-CV is tripped, breaking the holding circuit to coil relays 23CR and 24CR, deenergizing 23CR, 24CR and 4M, stopping the conveyor.

In order to insure that the veneer stack is removed from the unload end of the conveyor by the time another stack is ready to be lowered onto the conveyor at stations H or H', a warning horn is provided and energized as follows: if a stack is ready to be lowered onto the conveyor at station H or H' so that station H lower relay 19CR (line 132) or station H' lower relay 26CR (line 157) is energized, and if the conveyor stop limit switch 1LS-CV is tripped by a veneer stack being present on the conveyor unload end, then the warning horn (line 176) will be energized. If the stack is not removed, the veneer will continue to be stacked and the lift or support of stations H or H' will continue to be jogged down, tripping the station H lower safety limit switch 5LS-L1 (line 177), or the station H' lower safety limit switch 5LS-L2 (line 178) (see also FIG. 18). When 5LS-L1 or 5LS-L2 is tripped and the corresponding lower relay 19CR or 26CR has not been energized to lower its lift because a veneer stack is present at the conveyor unload end, tripping 1LS-CV, then a stop belts relay 31CR (line 177) is energized. When this relay is energized, its normally closed contacts in the belt motor starter holding circuit (line 9) open, deenergizing the belt motor starter 3M (line 8), stopping the belts and preventing veneer from being fed into the machine. At this point, the machine must be switched to hand control, the veneer at the conveyor unload end removed, the lift (whichever lift has actuated its lower limit switch causing stoppage) lowered, placing the stack on the conveyor. The belt motor is then started by depressing the start-belt-motor pushbutton 6PB (line 8). Hand operation of the apparatus is possible through the hand-auto selector switch 1SS (line 12) which sets the machine for hand control and permits controlling by depressing the proper pushbuttons provided in the circuit disclosed.

From the foregoing description, it will be apparent that the objects referred to and others have been achieved with novel methods of and apparatus for automatically sorting veneer sheets according to size and placing the sheets in stacks, aligned to a leading edge of the veneer sheets. While a preferred embodiment of the invention has been disclosed in detail, it will be understood that various modifications and alterations may be made therein without departing from the spirit and scope of the invention.

Having thus described our invention, what we claim is:

1. A method of stacking veneer sheets including the steps of transporting sheets of veneer along a path above a plurality of stacking stations, frictionally engaging an upper surface of the veneer sheets with a moving member, maintaining the sheets in contact with said moving member by reducing ambient pressure above said sheets, diverting sheets from said path to said stacking stations, gripping a leading edge of each transported sheet at locations across the sheet only after it is at least partially diverted from said path and pulling the edge against an aligning abutment at the stacking station, and thereafter releasing said gripped edge and allowing the sheet to settle and form a stack of sheets in which leading sheet edges are aligned.

2. A method of stacking veneer sheets including the steps of transporting veneer sheets of different character along a path, selectively diverting sheets from the path at different locations to form plural stacks each of sheets of a similar character, receiving and supporting a leading portion of diverted sheets at a location vertically displaced from said path on members movable in the general direction of sheet travel along said path, clamping a leading portion of a diverted sheet against said movable members and pulling each diverted sheet by the clamped leading portion in the direction of travel against a stationary abutment and continuing to move said movable members in the direction of travel to release said diverted sheet to a stack with the leading edge aligned therewith.

3. A method of stacking veneer sheets including the steps of transporting veneer sheets of different character along a path, selectively diverting sheets from the path at different locations to form plural stacks each of sheets of a similar character, introducing a flow of air beneath each sheet as it is diverted to partially support or cushion the sheet, receiving and supporting a leading portion of diverted sheets on members displaced vertically from said path and movable in the general direction of sheet travel along said path, clamping said leading sheet portion against said movable members and pulling each diverted sheet by the clamped leading portion in the direction of travel against a stationary abutment while the flow of air is continued, and continuing to move said movable members in the direction of travel to release said diverted sheet to a stack with the leading edge aligned therewith.

4. A method of sorting and stacking veneer sheets, including the steps of conveying sheets of different size along a path over stacking stations, detecting the size of the sheets and directing conveyed sheets of common size downward from said path to a common stacking station, engaging a leading portion of a downwardly directed sheet and aligning the leading edge against an abutment, supporting the aligned sheet on a stack of sheets, aligning side edges of the sheet to the stack, sensing the top of the stack when it reaches a predetermined level and lowering the stack a limited distance in response to said sensing to maintain the distance from the top of the stack to said path between predetermined upper and lower limits, and removing the stack from the stacking station after the stack reaches a predetermined size.

5. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to selectively engage a moving veneer sheet and divert it downward from the conveyor, and movable means adjacent said path of movement and adjacent said abutment to engage a leading portion of a diverted sheet in front of said abutment and to partially support and carry the sheet against said abutment and to thereafter release said sheet.

6. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to engage and divert moving veneer sheets downward from the conveyor, movable sheet receiver means beneath said path and adjacent said abutment and including a lower extending support part reciprocable along the general path of sheet movement for initially receiving and supporting a leading portion of a diverted sheet and an upper sheet clamping part movable toward and away from said lower support part to clamp a sheet received on said lower support, means to move said upper sheet clamping part toward and away from said lower part, and means to reciprocate said sheet receiving means along the general path of sheet movement to carry a supported sheet into engagement with said abutment.

7. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to divert moving veneer sheets downward from the conveyor, an arm upstanding from a support beneath said path of movement, the upper end of said arm being located beneath said path and having a sheet gripper extending from the upper end in a direction generally along the said path opposite to the direction of sheet movement, said gripper including lower and upper members relatively movable between open or spaced relationship and closed or clamping relationship, means to pivot said arm between a forward position in front or upstream of said abutment, and means to close said upper and lower members adjacent the forward position and to open said members adjacent the withdrawn position whereby said pivoted arm can be reciprocated to receive and grasp a leading portion of a diverted sheet upstream of said abutment, guide and move said sheet to position a leading edge of the sheet against said abutment and to release said sheet in predetermined alignment with a stack.

8. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to divert moving veneer sheets downward from the conveyor, and at least two arms upstanding from a support beneath said path, adjacent said abutment and pivoted about an axis transverse to said path of movement, the upper end of each arm being located beneath said path and having means to grasp a leading portion of a diverted sheet and to partially support and move the sheet in a forward direction against said abutment, and means to alternately move said two arms forward and back about said pivot to engage alternate ones of conveyed sheets.

9. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure

and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to divert moving veneer sheets downward from the conveyor, movable means adjacent said path of movement and adjacent said abutment to engage a leading portion of a diverted sheet and to partially support and carry the sheet in a forward direction against said abutment and to thereafter release said sheet, a sheet support beneath said conveyor for receiving diverted sheets with leading edges aligned, means to lower said sheet support to prevent a supported stack of sheets from extending above a predetermined level, sheet aligners movable transversely of said path to engage and align edges of stacked sheets that extend in the direction of sheet movement, and sheet sensing means carried by a sheet side aligner to actuate said means to lower said sheet support when said stack reaches said predetermined level.

10. Apparatus for stacking veneer sheets, including a frame structure, a driven conveyor carried by said frame structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to divert moving veneer sheets downward from the conveyor, means for engaging a leading portion of a veneer sheet at locations across the sheet, said means including a movable sheet receiver beneath said path and adjacent said abutment and including a lower extending support part reciprocable along the general path of sheet movement for initially receiving and supporting a leading portion of a diverted sheet and an upper sheet clamping part movable toward and away from said lower support part to clamp a sheet received on said lower support, and means to move said upper sheet clamping part toward and away from said lower part and to reciprocate said parts along the general path of sheet movement, said upright abutment including a portion beside and directly adjacent said movable sheet receiver located to abut a leading edge of the sheet directly beside a portion of the sheet engaged by said sheet receiver to prevent distorting or tearing of the sheet when the sheet is moved by said sheet receiver into contact with said abutment.

11. Apparatus for stacking veneer sheets, including a support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least portions of said path to cause the veneer sheets directly beneath said conveyor to be biased against the conveyor, an upright abutment beneath said path for obstructing movement and aligning leading edges of sheets diverted from the conveyor to form a stack, means upstream from said abutment relative to the direction of sheet travel to divert moving veneer sheets downward from the conveyor, movable means beneath and adjacent said path of movement and adjacent said abutment to engage a leading portion of a diverted sheet and to partially support and carry the diverted sheet in a forward direction against said abutment and to thereafter release said sheet, and means beneath said conveyor to temporarily increase the air pressure beneath a diverted sheet when a leading portion is engaged by said movable means to partially support the sheet during its downward movement from the conveyor to a positive support.

12. In apparatus for aligning and stacking veneer sheets moved along a generally horizontal path, two sets of aligning arms each supported for pivotable movement about an axis perpendicular to the path of sheet movement and generally parallel to leading edges of said sheet, arms of each set being located beneath and spaced transversely of said path, means to alternately pivot the set of arms from a rearward or returned position to a forward position in a direction opposed to that of the sheet movement along the path and thereafter to a returned position, each arm including a movable jaw, and means to close the jaws when the respective arms are in a forward position, to hold the jaws closed while said arms are pivoted to a rearward position, to open the jaws when the arms are in said rearward position, and to carry the jaws forward in an open condition.

13. Apparatus for sorting and stacking veneer sheets including support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least a portion of said path to cause veneer sheets directly beneath said conveyor to be biased against the conveyor, at least two stacking stations spaced longitudinally beneath said conveyor for receiving veneer sheets of different characteristics, detecting means along said path sensitive to different characteristics of veneer sheets carried by said conveyor, means above each stacking station to divert sheets of selected predetermined characteristics downward from the conveyor in response to detection thereof by said detecting means, an abutment beneath said path at a forward portion of each stacking station relative to the direction of sheet movement for obstructing forward movement of the leading edge of sheets diverted from the conveyor, movable means at a forward portion of each stacking station adjacent said abutment to partially support and carry the sheet in a forward direction against said abutment and to release the sheet, vertically movable means at each stacking station beneath the conveyor to support aligned sheets, side aligning means on opposite sides of the path of sheet movement movable transversely of the direction of sheet travel to engage and align sheets on said support means, means to intermittently move said side aligning means toward each other to engage and align veneer sheets on said support, means for sensing a predetermined height of a stack of veneer sheets on said support means, and means to move said support means vertically downward a predetermined distance in response to the sensing of the veneer stack by said stack height sensing means.

14. Apparatus for sorting and stacking veneer sheets including support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least a portion of said path to cause veneer sheets directly beneath said conveyor to be biased against the conveyor, at least two sheet stacking stations spaced longitudinally beneath said conveyor for receiving veneer sheets of different width, sheet detecting means along said path sensitive to different predetermined widths of veneer sheets to detect the presence and size of veneer sheets carried by said conveyor, means above each stacking station to divert sheets of predetermined width downward from the conveyor in response to detection thereof by said sheet detecting means, arm means adjacent the front of each stacking station beneath said conveyor to receive and align sheets of veneer diverted from said conveyor, said arm means being selectively pivotable from rearward to forward positions initiated in response to the sensing by said sheet detecting means of a veneer sheet of a size to be diverted to the respective stacking area, and said arm means having a movable jaw initially open when said arm means is in a forward position, said jaw being movable to a closed condition after a time delay in response to the sensing by said sheet detecting means of a veneer sheet of a size to be diverted to the respective stacking station, to yieldably engage a leading edge of a diverted veneer sheet and to thereafter move the arm to a rearward position, an abutment to obstruct movement of a veneer sheet carried by said arm means to cause said sheet to slide from said jaw when against said abutment, means to open said jaw when said arm is in a rearward position, means to supply air under pressure to a zone beneath a diverted sheet to partially support the sheet during engagement and movement of the sheet by said arm means, and vertically movable means at each stacking station beneath the conveyor to support aligned sheets, side aligning means on opposite sides of the path of sheet movement movable transversely of the direction of sheet travel to engage and align sheets on said support means, means to intermittently move said side aligning means toward each other to engage and align veneer sheets on said support, means for sensing a predetermined height of a stack of veneer sheets on said support means, and means to move said support means vertically downward a predetermined distance in response to the sensing of the veneer stack by said stack height sensing means.

15. In apparatus for stacking veneer sheets beneath an overhead conveyor, a support on which veneer sheets are stacked, means to move the support vertically downward in increments to maintain the top of a supported stack between predetermined upper and lower levels as sheets are added to the stack, means movable toward and away from the stack adjacent the predetermined upper level to align a supported sheet, and means carried by said movable means for sensing the presence of the stack on the support at said predetermined upper level to initiate downward movement of said support.

16. Apparatus for sorting and stacking veneer sheets, including support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least a portion of said path to cause veneer sheets directly beneath said conveyor to be biased against the conveyor, at least two stacking stations spaced longitudinally beneath said conveyor for receiving veneer sheets of different sizes, sensing means located along said path for distinguishing between veneer sheets of different sizes carried by said conveyor, means adjacent each stacking station for selectively diverting sheets downward from said path, and movable means beneath said path and adjacent each stacking station for at least partially receiving, supporting and carrying a diverted sheet into an aligned position relative to a stack of sheets at the respective station, and means for actuating said means for diverting sheets at a particular stacking station in response to the detecting of a sheet of a size to be stacked therein by said sensing means.

17. Apparatus for sorting and stacking veneer sheets, including support structure, a driven conveyor carried by said support structure and defining a horizontal path of movement for veneer sheets, means along said conveyor to reduce ambient pressure above at least a portion of said path to cause veneer sheets directly beneath said conveyor to be biased against the conveyor, at least two stacking stations spaced longitudinally beneath said conveyor for receiving veneer sheets of different sizes, sensing means located along said path for distinguishing between veneer sheets of different sizes carried by said conveyor, means adjacent each stacking station for selectively engaging and diverting sheets downward from said path, and movable means beneath said path and adjacent each stacking station for at least partially receiving, supporting and carrying a diverted sheet into an aligned position relative to a stack of sheets at the respective station, said movable means including a portion engageable by said means for diverting sheets and movable thereby from a sheet receiving position to a position in which the sheet is aligned with other sheets at the station and released, and means for actuating said means for diverting sheets at a particular stacking station in response to the detecting of a sheet of a size to be stacked therein by said sensing means.