Dec. 30, 1958 H. K. HALVORSEN ET AL 2,866,642

PLYWOOD STACKING MACHINE

Filed Jan. 18, 1956 4 Sheets-Sheet 1

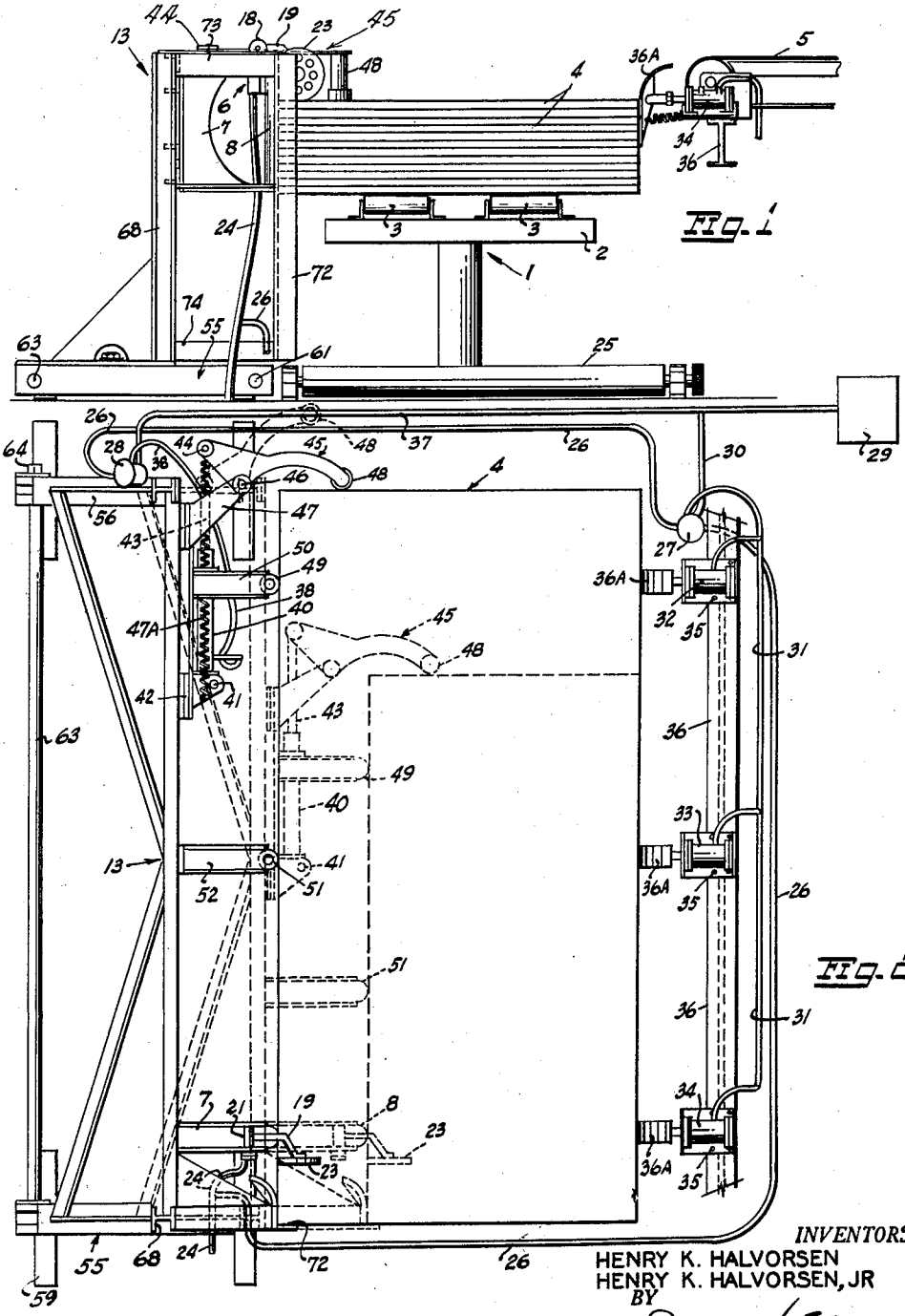

Fig. 1

Fig. 2

INVENTORS
HENRY K. HALVORSEN
HENRY K. HALVORSEN, JR
BY
James L. Kirman
ATTY.

Dec. 30, 1958 H. K. HALVORSEN ET AL 2,866,642

PLYWOOD STACKING MACHINE

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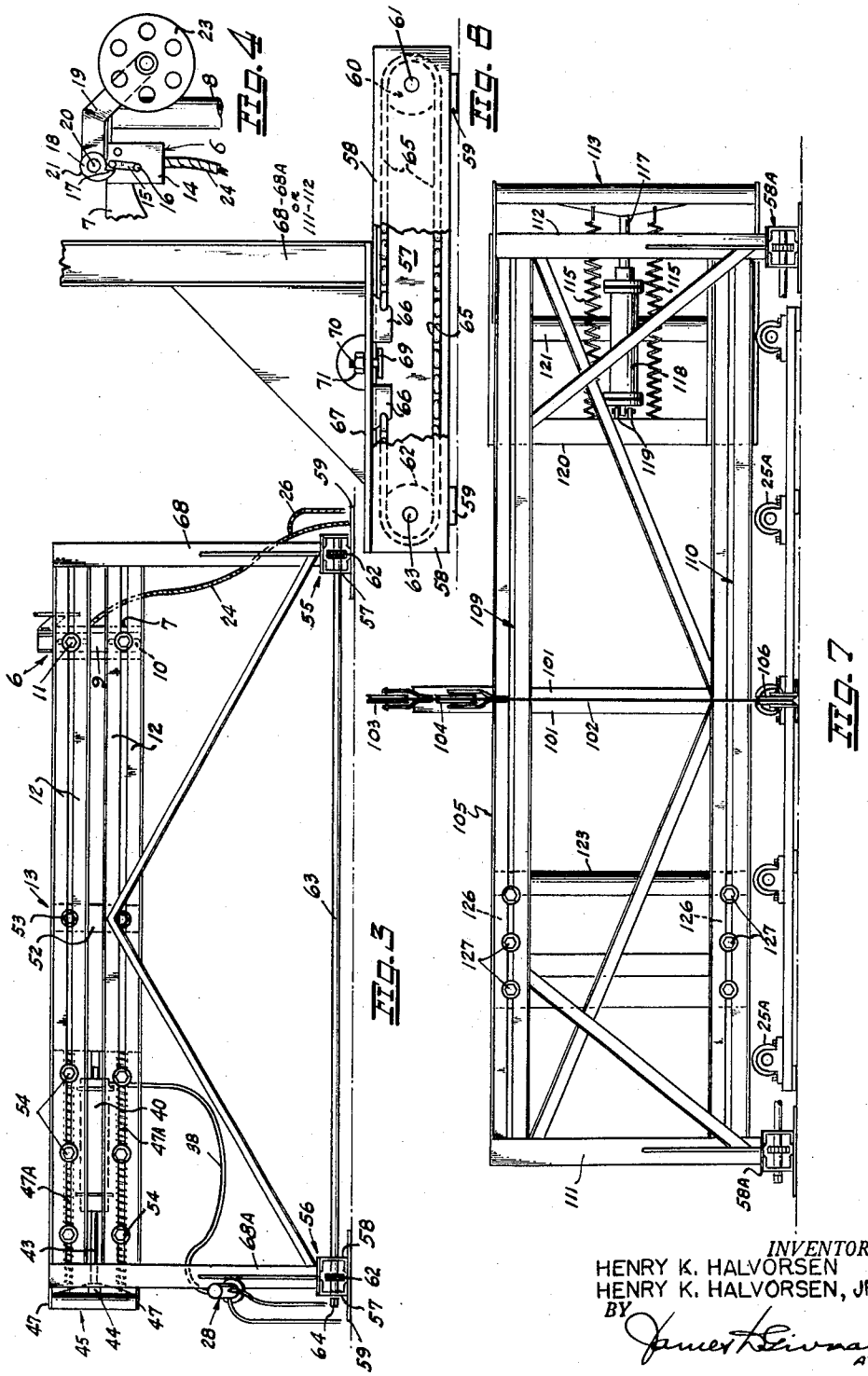

FIG. 4

FIG. 8

FIG. 3

FIG. 7

INVENTORS
HENRY K. HALVORSEN
HENRY K. HALVORSEN, JR
BY
James L. Zinman
ATTY

Dec. 30, 1958 H. K. HALVORSEN ET AL 2,866,642

PLYWOOD STACKING MACHINE

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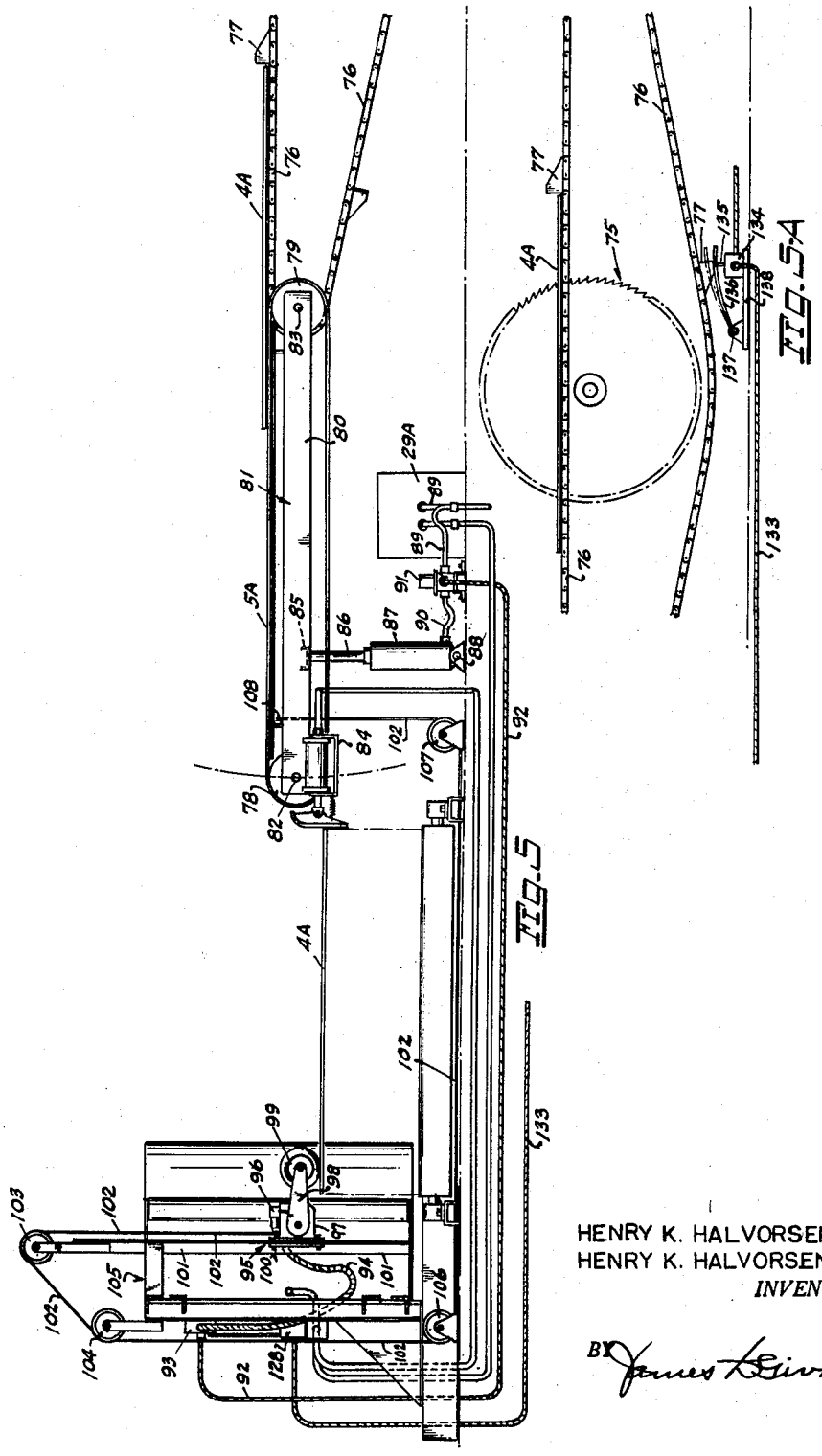

FIG. 5

FIG. 5-A

HENRY K. HALVORSEN
HENRY K. HALVORSEN, JR
INVENTORS

BY James L. Givnan
ATT'Y

Dec. 30, 1958 H. K. HALVORSEN ET AL 2,866,642

PLYWOOD STACKING MACHINE

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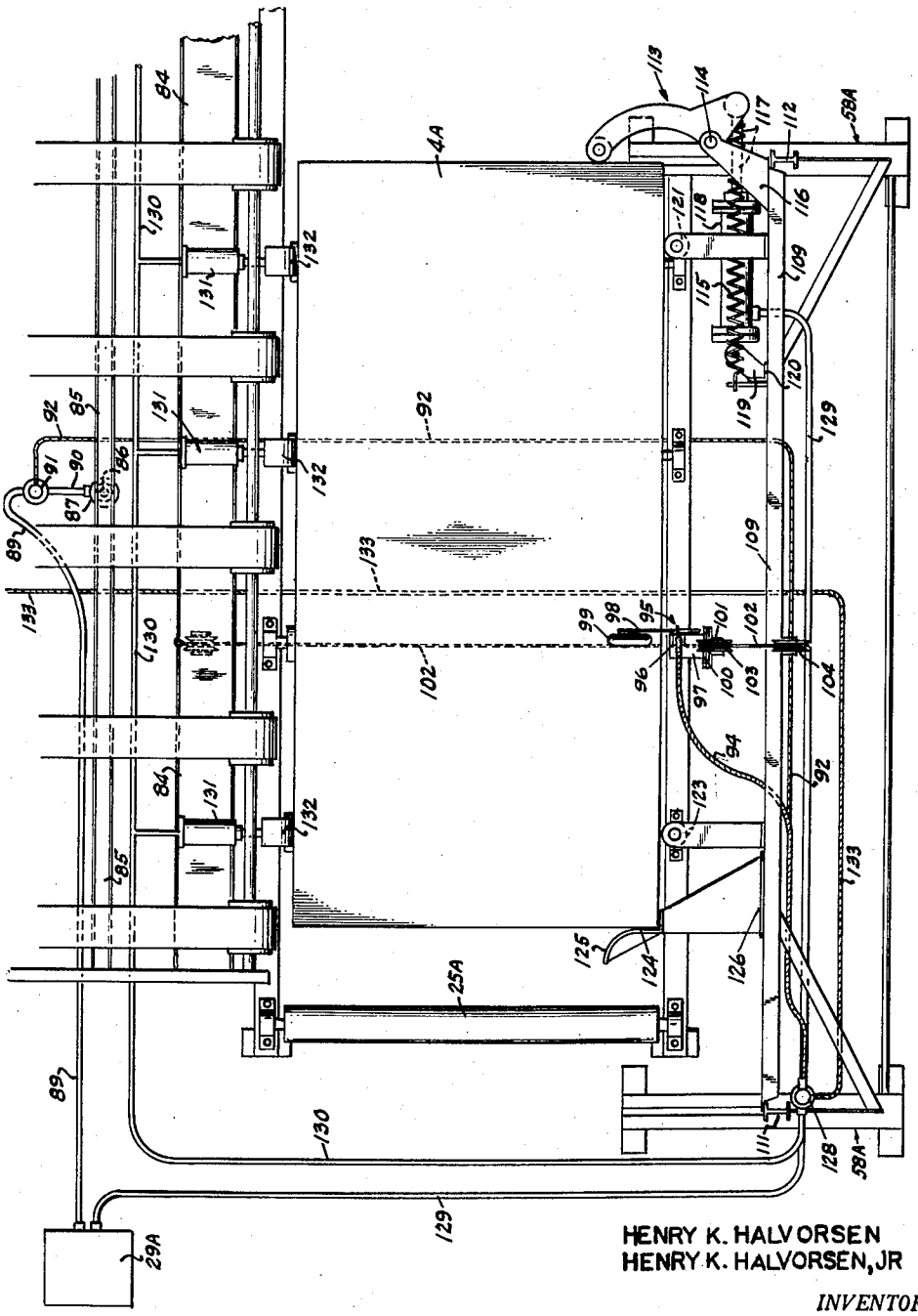

FIG. 6

HENRY K. HALVORSEN
HENRY K. HALVORSEN, JR
INVENTORS

BY James R. Sinnar
ATT'Y

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2,866,642

PLYWOOD STACKING MACHINE

Henry K. Halvorsen and Henry K. Halvorsen, Jr.
Sutherlin, Oreg.

Application January 18, 1956, Serial No. 559,933

3 Claims. (Cl. 271—89)

This invention relates to improvements in machines for conveying and stacking articles of sheet material such as plywood panels and the like.

It is one of the principal objects of the invention to provide a machine of this character in which pressure actuated means are automatically intermittently set into operation by the conveyor means and by each individual panel as it is added to a stack to exert pressure against the end and side edges of the panels and to arrange the same in vertical alignment in an orderly manner against vertical abutments within the machine.

With the foregoing and other objects and advantages in view it will become apparent as the description proceeds that the invention consists essentially in the novel combination and arrangement of parts hereinafter described in detail in the following specification, illustrated in the accompanying drawings, and finally pointed out in the appended claims.

In the drawings:

Figure 1 is an end view of the invention as applied to a plywood stacker hereinafter referred to as the "elevator type."

Figure 2 is a top plan view of Figure 1 with the conveyor removed for clearness of illustration.

Figure 3 is a rear view of a backstop frame shown in Figures 1 and 2.

Figure 4 is an enlarged detail view of a limit switch and actuating means therefor.

Figure 5 is an end view of a modified form of the invention as applied to a plywood stacker hereinafter referred to as the "tipple type."

Figure 5A is a continuation of Figure 5.

Figure 6 is a fragmentary top plan view of Figure 5.

Figure 7 is a rear view of a backstop frame shown in Figures 5 and 6 with parts omitted for clearness of illustration.

Figure 8 is an enlarged detail view of an adjustable and lockable mounting for the end members of either of said backstop frames.

Referring now more particularly to the drawings:

The plywood stacker of the elevator type shown in Figures 1 and 2 includes an elevator generally indicated by reference numeral 1 having a load platform 2 provided with gravity rollers 3 onto which plywood sheets 4 are ordinarily piled in a somewhat disorderly manner as they fall from the conveyor belts 5 coming from the end trim sizer saws (not shown). The elevator is caused to be lowered intermittently by a limit switch generally indicated at 6 (Figures 1, 3 and 4) carried by a support 7 for a vertical backstop roller 8 and adjustable and lockable to maximum stack height by means of the support 7. For this purpose (Figure 3) the back wall 9 of the support is provided with vertical slots 10 through which extend bolts 11 for locking the support in vertically adjusted positions with respect to the longitudinal members 12 of a backstop frame indicated generally at 13.

The limit switch proper, preferably of the Micro type,

is contained within a housing 14 (see Figure 4) secured in any approved manner to the support 7. An arm 15 is pivotally attached to one wall of the housing 14 by its shaft 16 which extends to the interior of the housing to actuate the Micro switch therein. The free end of the arm 15 is in the path of rotary movement of an abutment 17 formed on a disc 18 secured to the inner end of a lever 19 and to a shaft 20 rotatably mounted in a bearing 21 secured to the top of the roller supporting frame 7. The outer end of the lever is provided with a wheel 23 at all times in contact with the topmost plywood panel of the stack. The electrical contacts of the Micro switch are connected in circuit through a conduit 24 with the usual solenoid valve (not shown) which controls the lowering of the elevator. Each time the switch closes when the wheel 23 is lifted by a plywood panel being added to the stack the elevator will be lowered a distance equal to the thickness of that panel whereupon the wheel having traveled downwardly with the stack will open the limit switch to stop the elevator. This intermittent operation continues until the rollers 3 on the load platform 2 reach a position in horizontal alignment with operatively interconnected take-off rollers 25 at both top ends of a pit within which the elevator platform 2 finally comes to rest at the termination of its downward travel.

Also controlled by the limit switch 6 through a branch circuit 26 are two solenoid valves 27 and 28. The valve 27 controls the flow of fluid pressure from a source 29 through lines 30 and 31 to three one-way hydraulic line-up cylinders 32, 33 and 34 mounted and secured as at 35 to a fixed horizontal beam 36. The piston rod of each cylinder is provided with a line-up shoe 36A. The solenoid valve 28 controls the flow of fluid pressure from the source 29 through lines 37 and 38 to an hydraulic one-way cylinder 40 pivotally attached as at 41 to a supporting plate 42. The piston rod 43 of the cylinder is connected as at 44 to one end of a gate 45 swingably mounted as at 46 to a pair of vertically spaced arms 47 carried by the plate 42. This end of the gate is connected to one end of a pair of tension springs 47A whose opposite ends are connected to the cylinder supporting plate 42 for normally maintaining the gate in an open position. The opposite end of the gate is provided with a vertical roller 48. A backstop roller 49 is rotatably mounted in a frame 50 also secured to the plate 42. Another backstop roller 51 is rotatably mounted in its frame 52 which is adjustably attached as at 53 to the longitudinal members 12 of the backstop frame 13.

The gate 45, backstop roller 49 and hydraulic cylinder 40 being secured to the supporting plate 42 are movable therewith as a unit and lockable in various adjusted positions lengthwise of the backstop frame 13 by means of attaching bolts 54.

The backstop frame as best shown in Figures 3 and 8 is mounted for inward and outward adjustment relative to the elevator 1 upon two base members generally indicated at 55 and 56 each made up of two spaced apart opposing channel members 57 and 58 secured to transversely arranged feet 59. A driven sprocket 60 is rotatably mounted within one end of its respective base member by its shaft 61 extending through the channel members thereof. Driving sprockets 62 are rotatably mounted within the opposite ends of the base members and secured to a common actuating shaft 63 squared as at 64 at one of its ends to accommodate a wrench for rotating the shaft and the driving sprockets. A sprocket chain 65 is entrained over the driving and driven sprockets and is connected to two plates 66 secured to and depending from a base plate 67 upon which the vertical end members 68 and 68A of the backstop frame 13 are mounted. Thus the backstop frame may be adjusted forwardly or rearwardly with respect to the base members

55 and 56. For locking the backstop frame in any adjusted position I provide a clamp comprising a plate 69 underlying the top flanges of the channels of the base members and welded to the bottom end of a bolt 70 extending upwardly through the space between the channels and through the base plate 67. Advancement of a nut 71 on the bolt 70 will lock the channel members. A corner line-up stanchion in the form of a vertical angle iron 72 is spaced rearwardly of the end member 68 of the backstop frame 13 and secured to the top and bottom ends thereof by cross members 73 and 74.

The operation of the invention thus far described and as applied to the elevator type of stacker is as follows: With the parts in their full line positions shown in Figure 2 and the gate 45 open in its broken line position the parts are set to accommodate 4' x 8' plywood panels 4 as they drop one at a time from the conveyor belts 5 onto the rollers 3 of the elevator. The starting position for the elevator is at the limit of its upward travel. In this position the first panel coming onto the rollers 3 will lift the wheel 23 of the limit switch 6 to close the electrical circuit to the elevator-lowering means as aforesaid and to the solenoid valves 27 and 28 to simultaneously energize the hydraulic gate cylinder 40 and the line-up cylinders 32, 33 and 34. The simultaneous operation of all these elements will lower the elevator a distance equal to the thickness of the plywood panel while at the same time the gate roller 48, now in its full line position in Figure 2, will force the opposite corner of the panel into the corner line-up stanchion 72 as the line-up shoes 36A of their respective line-up cylinders force the panel against the backstop rollers 49, 51 and 8. The panels are thus neatly stacked to any desired height with all their outside edges in true vertical alignment and ready to be rolled away from the elevator as it comes to rest with its rollers 3 in horizontal alignment with the take-off rollers 25 at both top ends of the elevator pit. When stacking panels of a smaller size such as, for example, that represented by dotted lines in Figure 2 it is merely necessary to adjust and lock as aforesaid the backstop frame 13 and the supporting plate 42 and its related parts in the dotted line positions shown. The conduits 24—26 and fluid pressure lines 37—38 being flexible will readily yield to the adjustment of the parts to which they are connected.

In the tipple type of plywood stacker shown in Figures 5, 5A, 6 and 7 the plywood panels 4A are fed to the sizer saws 75 by endless chains 76 having panel-energizing lugs 77 attached thereto at spaced intervals in the usual manner. The panels are picked up from the chains by conveyor belts 5A entrained over pulleys 78 and 79 rotatably mounted between beams 80 of a frame 81 by means of their respective shafts 82 and 83. The panels are thus stacked one upon the other on gravity rollers 25A rotatably mounted upon the floor as shown.

The frame 81 is tiltable upwardly and downwardly about the shaft 83 as indicated by the broken line applied to the shaft 82. The beams 80 are interconnected by cross beams 84 and 85. To the underside of the beam 85 is attached the top end of a piston rod 86 actuated by its piston within an hydraulic cylinder 87 swingably attached as at 88 to the floor and supplied with fluid pressure from a source 29A through lines 89 and 90 controlled by a solenoid valve 91. The valve 91 is connected in electrical circuit 92 through a junction box 93 and circuit 94 with a vertically slidable limit switch indicated generally at 95. The switch proper, indicated at 96, is of the Micro type mounted upon a frame 97 and actuated by an arm 98 provided with a wheel 99 at its outer end. The switch-supporting frame 97 is slidably attached as at 100 to a pair of vertical angle irons 101. A cable 102, secured at one of its ends to the switch frame 97, extends over a pair of pulleys 103 and 104 carried by a backstop frame 105 and under pulleys 106—107 attached to the floor and is secured at its opposite end as at 108 to the conveyor frame 81. As the arm 98 is swung upwardly by each plywood panel inserted beneath the wheel 99 it will close the switch 96 to actuate the solenoid valve 91 which in turn will supply fluid pressure to the cylinder 87 to tilt the conveyor upwardly but only to a distance slightly greater than the thickness of the inserted plywood panel. The resultant upward pull on the conveyor end of the cable will, of course, pull its opposite end and the switch frame 97 upwardly to a height sufficient to allow the arm 98 to swing down into a switch-open position and thereby break the circuit to the solenoid valve 91 to stabilize the hydraulic cylinder and conveyor frame in position for a repetition of the operation just described. These intermittent operations continue until the stacked plywood panels reach a predetermined height.

The backstop frame 105, as best illustrated in Figures 6 and 7, comprises, respectively, upper and lower vertically spaced apart pairs of longitudinal members 109—110 interconnected at their ends and supported by vertical end members 111—112 adjustably mounted on base members 58A in the same manner as the end frame members 68—68A in the elevator type are adjustably mounted on their base members 58.

A gate 113 is swingably mounted as at 114, against the tension of springs 115, to a pair of brackets 116 secured to the upper and lower longitudinal members 109—110 of the frame 105. The gate is connected to and actuated by the piston rod 117 of an hydraulic one-way cylinder 118 swingably attached to a pair of brackets 119 secured to the frame members 109—110 by an angle iron 120. A backstop roller 121 is attached by brackets 122 to the frame members 109—110 in a fixed position. A second backstop roller 123 and a vertical line-up bar 124 having a deflecting edge 125 are mounted to plates 126 adjustable lengthwise of the frame members 109—110 and lockable thereto by means of bolts 127.

A solenoid valve 128, mounted in any suitable manner to the end frame member 111, controls the flow of fluid pressure from the source 29A to the hydraulic cylinder 115 through a line 129 and through line 130 to a plurality of one-way hydraulic line-up cylinders 131 mounted upon the beam 84 of the conveyor frame 81. The piston rods of the line-up cylinders are provided with line-up shoes 132. The solenoid valve 128 is connected in electrical circuit 133 with a switch 134 whose switch arm 135 is actuated by a leaf spring 136 attached at one of its ends as at 137 to a base 138 and arranged in the path of travel of the lugs 77 on the feed chains 76.

From the foregoing it will be apparent that each time the circuit 133 is closed by the switch 134 the closing of the gate 113 by the cylinder 118 will vertically align the ends of the stacked panels 4A against itself and against the vertical line-up bar 124 and that the simultaneous operation of the line-up cylinders 131 will by means of their shoes 132 force the side edges of the panels into vertical alignment against the backstop rollers 121 and 123. Following the stacking and aligning operation the gate 113 is pulled open by the tension springs 115 upon release of fluid pressure to the cylinder to enable the stacked panels to be moved away by the gravity rollers 25A.

While we have shown particular forms of embodiment of our invention we are aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described our invention what we claim as new and desire to protect by Letters Patent is:

1. In combination with an elevator, a conveyor for delivering and stacking a succession of articles of sheet material at predetermined intervals onto said elevator, a backstop frame adjacent said elevator, electrically controlled pressure-actuated means carried by said frame and by said conveyor for forcing said delivered articles to one end and

one side of said frame for arranging the end and side edges of the articles in vertical alignment, and switch means carried by said frame and intermittently actuated by successively delivered articles to actuate said pressure-actuated means and to cause intermittent lowering of the elevator a distance equal to the thickness of each of said successively delivered articles.

2. In combination with a series of load-supporting rollers, a conveyor tiltable vertically with respect to said rollers for delivering and stacking a succession of articles of sheet material at predetermined intervals onto said rollers, a saw-feed chain associated with the conveyor and having spaced apart lugs attached thereto adapted to engage and deliver said articles from a saw or saws to said conveyor, a backstop frame adjacent said rollers, electrically controlled pressure-actuated means carried by the frame and by the conveyor for forcing said delivered articles to one end and one side of the frame for arranging the end and side edges of said articles in vertical alignment, electrically controlled pressure-actuated means connected to said conveyor for tilting the same, a switch operable by said saw-feed chain lugs and in circuit with said first mentioned pressure-actuated means for actuating the same and a second switch means slidably carried by said frame and intermittently operable by each of said successively delivered articles and connected to said conveyor for vertical movement simultaneously with the tilting of the conveyor, and said second switch means being in circuit with the last mentioned pressure-actuated means and progressively operable by each delivered article for intermittently tilting the conveyor upwardly a distance substantially equal to the thickness of each successively delivered article.

3. In combination with a series of load-supporting rollers, a conveyor for delivering and stacking a succession of articles of sheet material at predetermined intervals onto said rollers, a vertical backstop frame adjacent said supporting rollers, a vertically disposed line-up stanchion at one end of the backstop frame, a fluid pressure actuated gate swingably mounted at the opposite end of said frame and adapted to force said delivered articles against said line-up stanchion to thereby arrange their corresponding ends into vertical alignment, fluid pressure actuated line-up shoes carried by the conveyor for forcing said delivered articles against said backstop frame to thereby arrange the side edges of the articles in vertical alignment, electrically actuated solenoid valves connected to a source of supply of fluid pressure and controlling the flow of fluid pressure to said gate and to said line-up shoes, and switch means carried by said backstop frame in circuit with said solenoid valves and adapted to be intermittently actuated by successively delivered articles to actuate said solenoid valves.

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