May 8, 1962 D. L. SCHUBERT 3,033,391

PANEL BOARD PRESS LOADER

Filed March 30, 1959 2 Sheets-Sheet 1

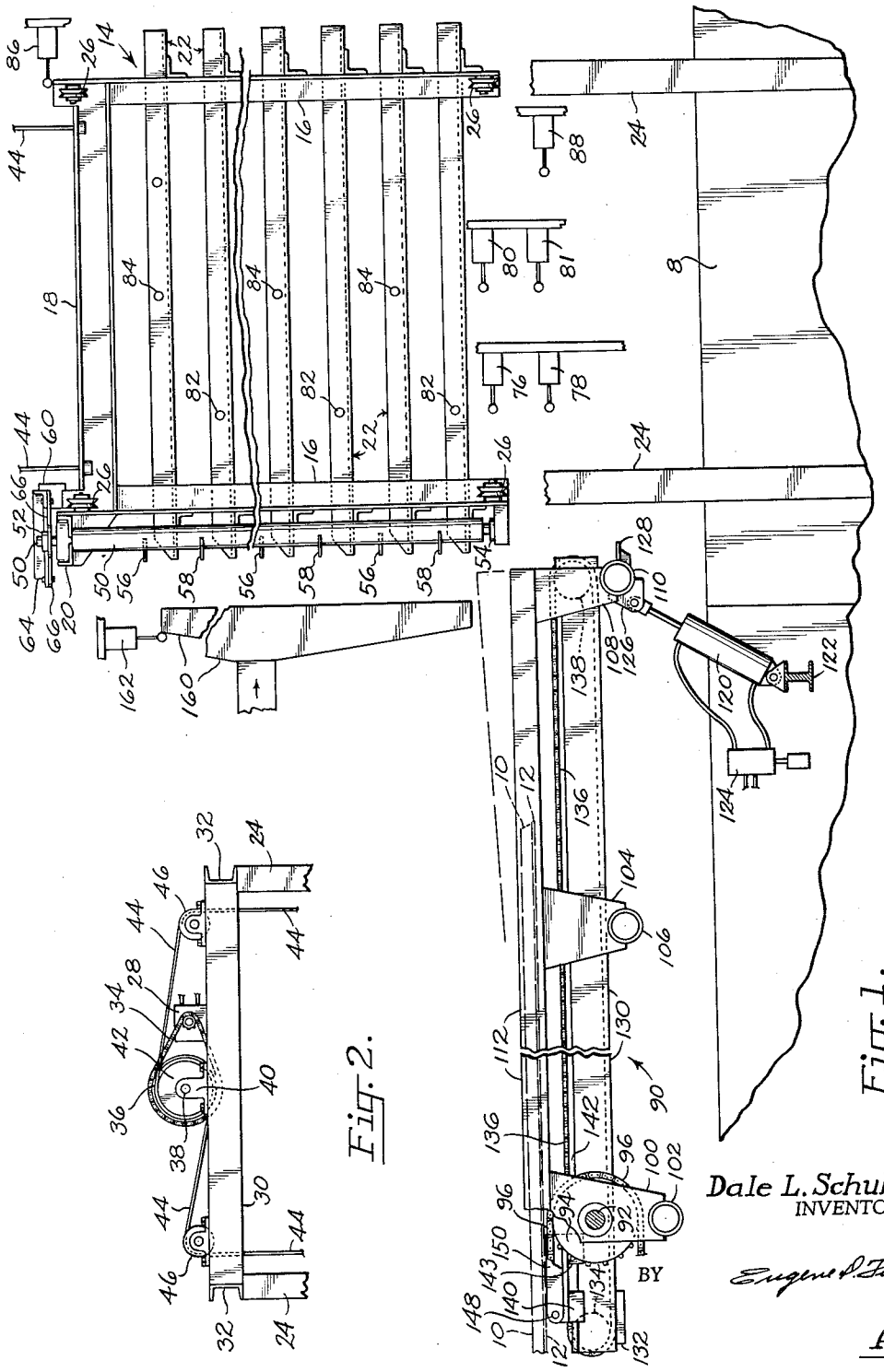


Fig. 1.

Fig. 2.

Dale L. Schubert
INVENTOR.

BY Eugene P. Farley
Atty.

May 8, 1962 D. L. SCHUBERT 3,033,391

PANEL BOARD PRESS LOADER

Filed March 30, 1959 2 Sheets-Sheet 2

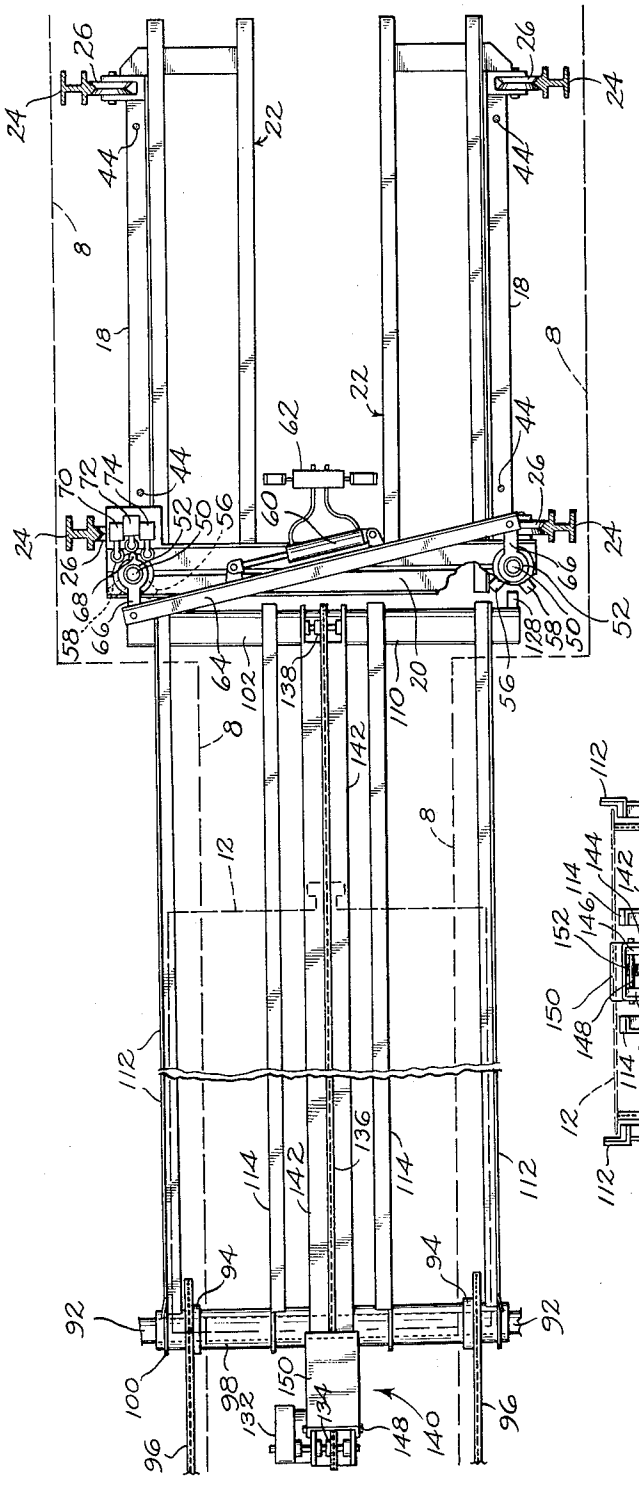


Fig. 3.

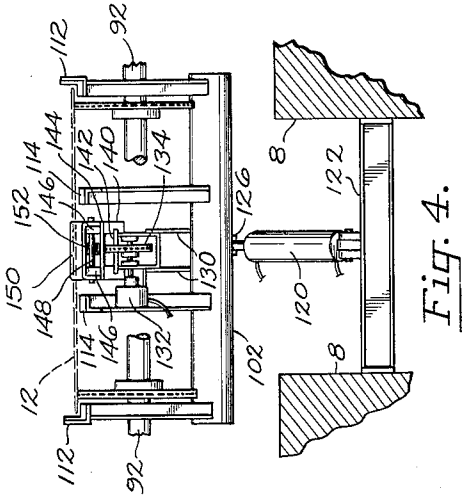


Fig. 4.

Dale L. Schubert
INVENTOR.

BY Eugene S. Farley
Atty.

United States Patent Office 3,033,391 Patented May 8, 1962

3,033,391

PANEL BOARD PRESS LOADER

Dale L. Schubert, Tacoma, Wash., assignor of one-half to Industrial Development Co., Tacoma, Wash., a corporation of Washington

Filed Mar. 30, 1959, Ser. No. 802,774
3 Claims. (Cl. 214—16.4)

This invention relates to apparatus for loading panel-making work units into a multi-opening press. It relates particularly to apparatus for loading fibrous mats into a multi-opening press in the production of wood composition board, although it also may be applied to apparatus for loading wood veneer assemblies into multi-opening presses in the production of plywood, and for like applications.

In the manufacture of wood composition board, wood in the form of fibrous elements, granules, particles, flakes, chips or shavings is first formed into mats including the desired proportion of adhesive material. These mats are either formed on caul plates or transferred thereto, and the mat-caul plate assembly thereafter is transferred to a multi-opening hot press for consolidation to the desired density.

In the foregoing sequence, it is important that the mats be undisturbed to prevent damage which would be reflected in the formation of imperfections in the finished panel. Also, it is desirable that the mat-caul plate assemblies be loaded into the press at a high rate of speed, and that the loading mechanism be synchronized with the mat production line, to achieve maximum output in a mill of given capacity.

It is the general object of the present invention to provide method and apparatus for achieving the foregoing objectives.

In the drawings:

FIG. 1 is a view in side elevation of the herein described panel board press loading apparatus;

FIG. 2 is a detail view in end elevation of the upper portion thereof;

FIG. 3 is a plan view of the apparatus of FIG. 1; and

FIG. 4 is an end elevation of the apparatus employed for feeding panel forming units into the loading apparatus.

Generally stated, the presently described invention comprises method and apparatus for loading a multi-opening press in the following sequence: First, there is provided a rack containing a plurality of vertically spaced apart shelves each dimensioned to receive a fibrous mat or other panel forming unit. The rack and feeding means therefor are reciprocated relative to each other in forward and reverse cycles. The panel forming units then are transferred successively from the feeding means to alternate ones only of the shelves in one of the cycles. Further units are transferred successively to the remaining ones of the shelves in the other cycle. The units in the rack then are aligned with the openings of a multi-opening press and transferred thereto, preferably in a single operation.

Considering the foregoing further and with particular reference to the drawings:

The presently described press loading apparatus is stationed over a pit 8 which, as viewed in FIGS. 1 and 3, is located to the right of forming apparatus, not illustrated, wherein fibrous mats 10 are formed on metal cauls 12 to produce a work unit which may be inserted into a hot press for consolidation of the mat into a composition wood panel, the units accordingly being termed herein "panel forming units." A group of such units are discharged from the presently described apparatus into a conventional multi-opening press, also not illustrated, stationed to the right of pit 8 as viewed in the drawings.

The loading apparatus includes a rack 14 made of vertical framing members 16, longitudinal horizontal framing members 18, and transverse horizontal framing members 20. Vertically spaced apart, longitudinally divided shelves 22 are supported on this framework. The vertical spacing of the shelves is such as to permit introduction of a panel forming unit onto each shelf in turn. The horizontal separation between the two divisions of each shelf is such as to permit the operation of means for transferring the units from the loading apparatus to the press, as will be described hereinafter.

The rack assembly is mounted for vertical reciprocation between posts 24 on which track wheels 26, the wheels 26 being mounted on each side of the rack.

The rack is reciprocated by means of a reversible, variable-speed hydraulic motor 28 mounted at the top of the apparatus on framing members 30, 32. Motor 28 drives chain 34 which engages a sprocket 36 keyed centrally to a shaft 38 journaled in bearings 40. A pair of drums 42 are also fixed to shaft 38, one on each side of sprocket 36. Cables 44 are reeved about the drums and pass over pulleys 46, their free ends being fastened to horizontal frame member 18 on rack 14. Accordingly, the rack may alternately be lowered gravitationally and then elevated at a controlled rate of speed by varying the direction of rotation of drums 42.

Rack 14 also mounts a pair of vertical rock-shafts 50 journaled in bearings 52, 54. The rock shafts assist in the alignment of an infeed conveyor, described hereinafter, with the rack shelves 22 for the introduction of panel forming units into shelves 22 of the rack and to this end are fitted with two alternating groups of radially extending dogs 56, 58 which are located substantially at a 90° angle to each other. Dogs 58 are employed when loading the rack on its descending cycle and dogs 56 when loading it in its ascending cycle.

The positioning of dogs 56, 58 is accomplished by means of a double acting hydraulic cylinder 60 which is in a circuit with and controlled by a solenoid operated valve 62 which is adjustable to three positions, i.e. forward, neutral and reverse. Cylinder 60 is pivoted to a frame member of rack 14. Its piston rod is pivotally connected to a tie bar 64, the opposite ends of which are pivotally connected to the ends of lever arms 66. The other ends of the lever arms are fixed to the upper ends of rock shafts 50.

One of shafts 50 also carries a finger 68 used to actuate a series of limit switches 70, 72, 74 which are in an electric circuit with valve 62 by means of which cylinder 60 is operated. Accordingly, by the operation of the cylinder and tie bar 64 which it drives, dog groups 56, 58 may be shifted between forward, reverse and neutral positions, i.e. one in which dogs 58 are operative on the descending cycle of the rack, one in which dogs 56 are operative during the ascending cycle of the rack and one wherein neither group of dogs is operative.

Other limit switches are suitably provided for controlling the vertical reciprocation of rack 14. These include switches 76, 78, 80, 81 which are actuated during the intermediate portion of the travel path of the rack, switches 76, 78 being actuated by contact members 82 located one on every other one of the shelves 22, starting with the bottom shelf. Switches 80 and 81, on the other hand, are actuated by contact members 84 located on the alternate ones of shelves 22, starting with the second shelf of the rack. Limit switches 86, 88 are positioned for contact by the rack at its extreme upper and lower stations.

The means for injecting the work units, e.g. the fibrous mat-caul plate assemblies into the shelves on rack 14 is illustrated particularly in FIGS. 1, 3 and 4. It comprises a frame 90 mounted tiltably about its infeed end

on a shaft 92. This shaft is common to the infeed conveyor system including sprockets 94 keyed to the shaft and chains 96 engaging the sprockets and supporting the units as they are conveyed into the apparatus.

Frame 90 is supported on a sleeve 98 in which shaft 92 is journaled. It includes a pair of vertically arranged plates 100 fixed centrally to sleeve 98 and interconnected at their lower end by bar 102, an intermediate pair of plates 104 the lower ends of which are interconnected by cross bar 106, and a third pair of plates 108 at the outfeed end, these being interconnected at their lower ends by crossbar 110.

To the upper ends of plates 100, 104, 108 are attached a pair of parallel tracks 112 which are dimensioned and spaced to receive and support the work units deposited on them by conveyor chains 96. A pair of slide bars 114 which are substantially coplanar with tracks 112 and are similarly supported on sleeve 98 and cross bar 110 cooperate in supporting the weight of the units and in moving them along in the direction of rack 14.

Using shaft 92 as a pivot point the outfeed end of the frame described above is raised and lowered by means of an air cylinder 120. This cylinder is pivotally connected to a fixed support 122 and is regulated by means of an air valve 124 which is adjustable to forward and reverse positions.

The piston rod of cylinder 120 is pivoted between tabs 126 which are fixed centrally to cross bar 110. This cross bar also carries a stop 128 positioned for engagement with the vertically arranged groups of dogs 56, 58 on rock shaft 50 carried by rack 14.

The mechanism employed for transferring the panel forming units from the tilting frame 90 to rack 14 is shown in FIGS. 1 and 4. It is mounted on a pair of plates 130 supported by cross bar 102. Supported on these plates, in turn, is a rotary hydraulic motor 132 which is coupled to a sprocket 134. Chain 136 engages this sprocket, its other end engaging an idler sprocket 138 supported on cross bar 110 at the outfeed end of the assembly.

Connected to chain 136 for horizontal reciprocation between the infeed and outfeed ends of feed apparatus 90 is a pushing trolley 140 which rides on a track 142 beneath and parallel to tracks 112 and slide bars 114.

The trolley assembly includes a pair of slides 143 on which is mounted a base plate 144. The latter mounts tabs 146 by which pin 148 is supported. Downwardly extending segments of a pushing plate 150 are pivotally mounted on pin 148, a spring 152 being interposed between the upper surface of base plate 144 and the under surface of pushing plate 150.

The leading edge of the latter plate is constructed to bear against the trailing edge of the mat-caul assemblies so that upon actuation of reversible motor 132 in a forward direction, the assemblies are pushed into rack 114. As this is being done, a new mat-caul assembly is being pushed onto tracks 112 by conveyor belt 96. Then upon retraction of the trolley assembly by reversal of motor 132, plate 150 is depressed against the resilient force of spring 152 so that it slides beneath the following caul plate, returning to its starting position.

The work units, e.g. the mat-caul assemblies, once loaded on shelves 22, are removed therefrom and pushed into the openings of the adjoining multi-opening press with which openings the shelves are aligned by means of a ram 160 indicated schematically in FIG. 1. This ram works horizontally in the space present between divided shelves 22 (FIG. 3). Its leading edge contacts the trailing edges of the panel forming units pushing them as a group into the openings of the press. On the return stroke of the ram, it engages a limit switch 162.

Operation

Assuming that the rack 14 is in the up position and that ram 160 has completed a forward and reverse stroke charging the press with a full load of units, the rack-refilling cycle is initiated by limit switch 162 being energized by the ram upon returning to its position of rest. The apparatus then will be in the full line position of the drawings.

Closure of limit switch 162 starts rack 14 on its gravitationally descending cycle. It moves downwardly, continuously at a uniform rate, until it reaches the bottom of its travel, whereupon it reverses and ascends, likewise at a uniform continuous rate, without stopping for the introduction of each work unit.

As the rack decends the lowermost of dogs 58 engages stop 128, pushing the tilting feed downwardly against the air cushion provided by air cylinder 120. When the lowermost of contact elements 82 strikes limit switch 76, hydraulic motor 132 is energized, advancing pushing trolley 140. This starts the work unit supported on injecting frame 90 on its way to the lowermost of shelves 22.

Motor 132 is set to advance the work unit completely onto the shelf, returning to its starting position (illustrated). As it does so, plate 150 on the pushing trolley assembly depresses and slides beneath a new work unit being introduced onto the feeding apparatus by conveyor chains 96.

By the time lower contact element 82 has reached limit switch 78, the operation of feeding the work unit onto lower tray 22 has been completed. The limit switch then energizes valve 124 so that it completely retracts the piston rod of cylinder 120, which now has been pushed down to within an inch or two of its withdrawn position by the weight of the descending rack.

Valve 124 operates at once to extend the piston rod of cylinder 120. However, in the brief interval of complete retraction, stop 128 is withdrawn downwardly out of engagement with the lower dog 58, and valve 62, which also has been energized by limit switch 78, shifts to allow cylinder 60 to move to the position wherein finger 68 contacts limit switch 72. This rotates rock shaft 50 until both sets of dogs 56, 58 are out of registration with stop 128.

During this sequence, rack 14 gravitates downwardly at a continuous rate so that lower dog 58 now has moved past the stop 128. Limit switch 72 closes a circuit including valve 62, retracting cylinder 60 to place dog group 58 again in registration with stop 128. Upon the continued descent of the rack, the next one of dogs 58 soon contacts stop 128, again depressing tilting feeder 90.

Motor 132 now starts driving the feeding trolley assembly 140 forwardly. Hence another work unit is introduced into the shelf which is third from the bottom of the rack.

The foregoing action continues until the odd numbered shelves are completely filled and the rack has reached its lowermost position in pit 8. Thereupon it contacts limit switch 88. This energizes motor 28, starting the rack on its elevating cycle. Limit switch 88 also energizes valve 124, retracting cylinder 120 completely so that stop 128 is disengaged from the uppermost of dogs 58. It further energizes valve 62 controlling hydraulic cylinder 60 and shifting the same to its intermediate position wherein finger 68 contacts limit switch 72. Rock shaft 50 now rotates to a position in which neither of dog groups 56, 58 registers with stop 128.

Upon continued elevation of the rack, contact member 84 on the uppermost of shelves 22 contacts limit switch 81. This operates valve 62 to extend cylinder 60, placing dog groups 56 in registration with stop 128. At the same time, valve 124 is operated to advance cylinder 120 until stop 128 engages the uppermost of dogs 56.

The rack now continues to move upwardly. When the uppermost tray contacts limit switch 80, valve 124 is energized and cylinder 120 retracts. At the same time,

valve **62** is energized, shifting dogs **56**, **58** to their neutral position. During this time a work unit is introduced into the upper shelf **22** by the reciprocating action of pushing trolley **140**.

This operation repeats itself until all of the even numbered trays have been filled and limit switch **86** is contacted. Thereupon ram **160** extends, pushing all of the work units into the press and retracting.

The cycle then repeats itself in the manner indicated.

Thus it will be apparent that by the present invention, I have provided a method and apparatus for charging a multi-opening panel board press continuously at a high production rate, there being no waste motion and no lost time whatsoever in the operation of the apparatus and of the units feeding it. In addition, the apparatus is synchronized with the production line so that the work units produced by the latter are transferred to the press at the same rate as that at which they are produced.

Still further, and of greatest importance, all of the operations performed on the work units are smoothly executed so that when the units comprise easily damaged, loosely felted fibrous mats, the mats are preserved intact. This factor then is reflected in the production of superior composition board products in the press to which the mats are charged.

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

Having thus described my invention, I claim:

1. Apparatus for loading a multi-opening press, comprising a rack containing a plurality of vertically spaced apart shelves each dimensioned to receive a panel-forming unit, drive means connected to the rack for substantially continuously raising and lowering it, feed means having infeed and outfeed ends, pivot means supporting the feed means adjacent its infeed end with the outfeed end stationed adjacent the rack, a vertical rock shaft mounted pivotally on the rack adjacent the outfeed end of the feed means, a plurality of vertically spaced dog means on the rack, one associated with each of said shelves and projecting radially from said rock shaft, stop means on the feed means at the outfeed end thereof, power means engaging the rock shaft for pivoting the latter between an operative position in which the dog means are engageable with the stop means and a neutral position in which the dog means are removed from engagement with the stop means, whereby in said operative position the outfeed end of the feed means is movable by and with the rack, and power means engaging the feed means for pivoting the latter in the direction opposite the direction of movement of the rack when the dog means are out of engagement with the stop means.

2. The apparatus of claim 1 wherein the feed means includes a reciprocating pushing trolley positioned for engaging the trailing edge of a panel-forming unit and pushing it onto a shelf of the rack, and resilient means engaging the trolley and urging the latter normally into said engaging position, the resilient means affording retraction of the trolley under the next succeeding unit during return of the trolley toward the infeed end of the feed means.

3. The apparatus of claim 1 wherein the shelves are longitudinally divided leaving a passageway therebetween, wherein vertically elongated ram means reciprocates through the passageway for pushing the units all at the same time from the shelves into a press.

References Cited in the file of this patent

UNITED STATES PATENTS

1,492,903	Street	May 6, 1924
1,901,928	Olson	Mar. 21, 1933
2,536,756	Lopez	Jan. 2, 1951
2,599,693	Chapman	June 10, 1952
2,612,275	Chapman	Sept. 30, 1952
2,704,608	Graf et al.	Mar. 22, 1955
2,972,423	Thurnher	Feb. 21, 1961

FOREIGN PATENTS

433,778	Great Britain	Aug. 15, 1935