

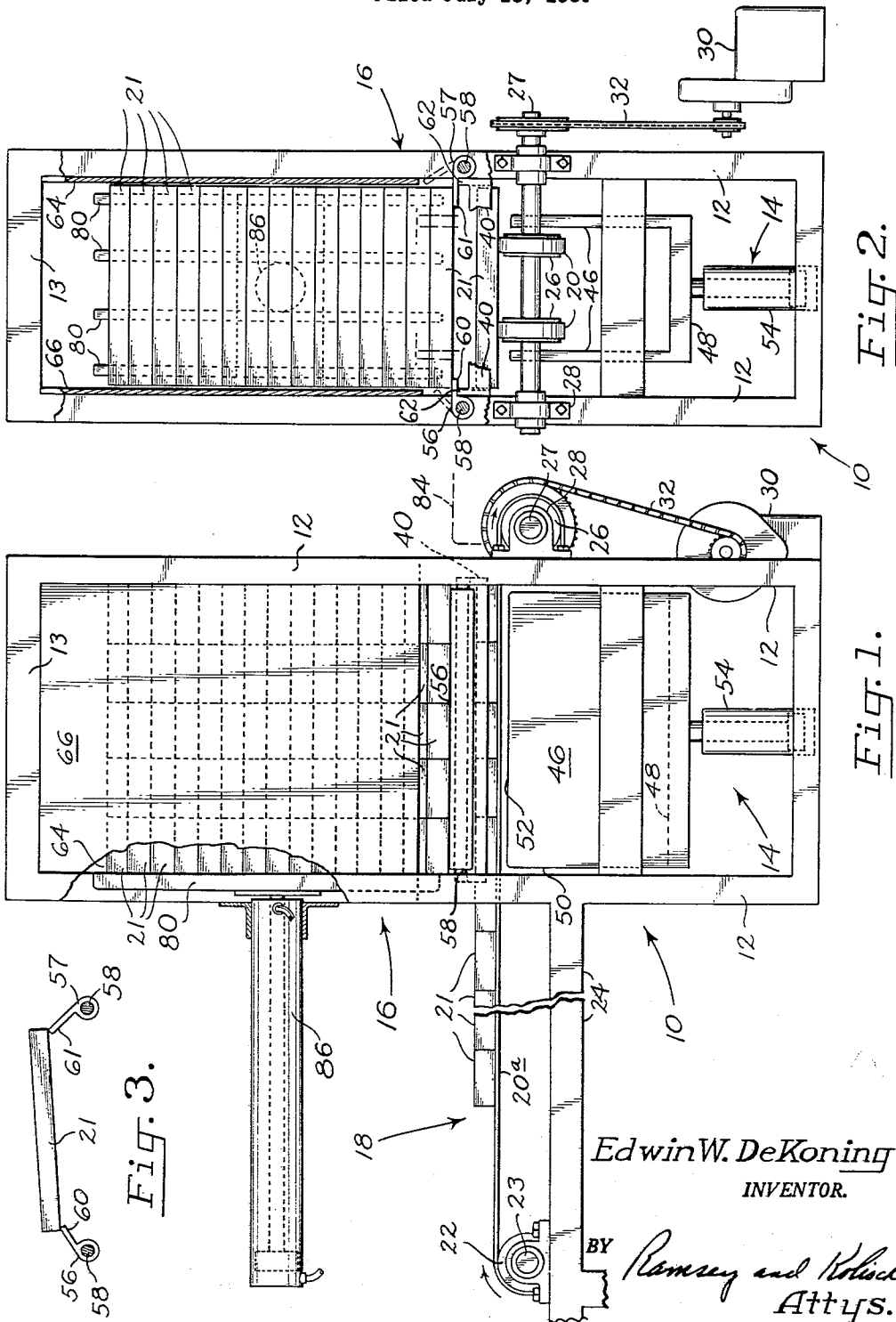
**June 4, 1963**

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**3,092,266**

## STACKER APPARATUS

Filed July 18, 1960



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## STACKER APPARATUS

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Filed July 18, 1960, Ser. No. 43,512

3 Claims. (Cl. 214-6)

This invention relates to a stacking mechanism or stacker, for stacking boards or similar bodies in a pile.

The invention is characterized by a number of features that make possible a relatively simple construction for the stacker. The stacker is easy to run and dependable in operation, and produces regular and orderly piles, substantially automatically and with little supervision.

In general terms, the stacker of this invention comprises a conveyer defining a path of travel for boards, with the boards traveling sidewise on and with their ends on either side of the conveyer. Positioned above the conveyer is stack-supporting structure, operable to support a forming stack. Movable up and down and through the path of travel defined by the conveyer is hoist mechanism which may be actuated to elevate a series of edge-butted boards from the conveyer and to move such boards into the bottom of a forming stack. The stack-supporting structure is constructed to enable boards to be moved up through the bottom thereof, but prevents the return of boards when the hoist mechanism is returned to a position below the conveyer. In this way, successive layers of boards are added to the stack from the bottom of the stack.

Thus, a general object of the invention is to provide an improved construction for a stacker, wherein boards are added to the stack from the bottom, and the weight of the forming stack is employed to promote orderly positioning of boards in the stack as it forms.

When layers of boards are added successively to the bottom of a stack, a construction is possible wherein the place of addition to the stack automatically may be maintained at a constant height. This is because it is only the top of the stack that rises as the stack grows. Thus, by this invention, it is possible to employ a ram or fluid motor for actuating the hoist mechanism having a fixed length of stroke. Whether the stack be high or low, the hoist mechanism moves the same distance during the addition of boards. Obviously this simplifies the control and construction of the stacker. A further feature and object of the invention, therefore, is to provide a stacker having a hoist mechanism with substantially a fixed length of stroke producing addition of boards to the stack.

In an embodiment of the invention, plural lifters are contemplated spaced to clear the upper runs of belts in the conveyer when they are raised to lift a series of boards. Such lifters have bounding edges or surfaces facing the feed side of the conveyer that define an upright plane extending transversely of the conveyer. When the lifters are in a raised position, these bounding edges function as a stop means preventing forward travel of boards on the conveyer beyond the feed side of the lifters. An object of the invention is to provide a construction wherein smooth-surfaced conveyer belts are used to transport boards, and the hoist mechanism comprises lifters as described, whereby when the lifters are raised, further feed to the means stacking the board may be automatically stopped, without actually stopping the conveyer. On lowering the lifters below the conveyer belts, forward movement of boards is again permitted and any backlog which may have collected on the conveyer automatically then moves into a feed position on the lifters.

Another object of the invention is to provide novel stacking apparatus which includes novel elongated holders providing the bottom of a support structure for hold-

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ing a forming stack, such holders being located on either side of the conveyer and being pivotable about axes paralleling the conveyer. These are pivotable between a lowered position, wherein the holders define a support plane for a stack, to a raised position, wherein they have swung upwardly and away from each other. The holders are swung to a raised position by pushing a layer of boards about to be added to the stack against their under sides, and in their raised position, such a layer may be moved beyond the holders and take its place against the bottom of the stack.

Still another object of the invention is to provide a stacker mechanism which also includes means for removing a stack from the stack-supporting structure after it is formed, so as to free the structure for the production of a subsequent stack.

Still another object is to provide a construction wherein the boards automatically tend to align themselves as they form a stack. The stack is shifted slightly up and down as boards are added thereto, and this movement is used to produce an aligning action in the stack.

Other objects and features of the invention will become more fully apparent as the following description is read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevation of apparatus constructed according to this invention, illustrating conveyer belts in the apparatus defining a path of travel for boards and a support plane for these boards, hoist mechanism for lifting boards from the support plane defined by the belts, and structure over the upper runs of the belts for supporting a forming stack;

FIG. 2 is an end elevation of the apparatus illustrated in FIG. 1 with portions removed; and

FIG. 3 illustrates holders for a stack in the apparatus, showing them in one of the positions they occupy during the forming of a stack.

Referring now to the drawings, in the embodiment of the invention illustrated, 10 indicates generally the frame of the apparatus, including verticals 12 and horizontal members 13 mounting hoist mechanism 14 provided for lifting boards into a forming stack, and stack-supporting structure indicated generally at 16 for supporting a forming stack. Also mounted on frame 10 is an elongated belt conveyer means 18, for transporting boards into a position wherein they may be fed by the hoist mechanism 14 into stack-supporting structure 16.

Specifically, belt conveyer means 18 comprises plural, relatively smooth-surfaced and laterally spaced belts 20 substantially parallel to one another and with horizontal upper runs 20a defining a support plane for boards and a path of travel for boards with the boards traveling from left to right in FIG. 1. Boards, such as boards 21, travel sidewise on the conveyer and with their ends on opposite sides of the conveyer. The feed ends of the belts 20 are trained over pulleys 22 supported by a pulley shaft 23 on horizontals 24 of the frame, and the belts at the offbearing end of the conveyer means travel over pulleys 26 supported by a pulley shaft 27 and brackets 28 on verticals 12. Drive to the belts is by a motor 30 connected to shaft 27 mounting pulleys 28 by a chain 32. In a preferred embodiment, the belts normally are driven constantly, and hoist mechanism 14 is operated intermittently to raise a layer of boards off the support plane defined by the belts. During the time that the hoist mechanism is operated, forward travel of boards on the belts is stopped, and a backlog of boards may build up on the conveyer means. By "relatively smooth-surfaced" belts, it is intended to describe belts constructed to enable boards to slide over their upper runs should forward travel of the boards be stopped and the conveyer left running, as compared to belts with lugs or similar devices where positive traction is produced.

Near the offbearing end of the conveyer is a stop or abutment means 40. This is mounted on the frame and disposed adjacent the support plane defined by the upper belt runs. Stop means 40 functions to index the forward edge of a layer of boards. A board traveling down the conveyer reaches the stop means and is aligned by this means transversely of the conveyer, and its forward travel is stopped. Succeeding boards traveling down the conveyer back up from the first board in this aligned position. Ultimately a series of edge-buttressed boards is formed in preparation for placing a new layer of boards in a stack.

Hoist mechanism 14 comprises plural lifters, indicated at 46, joined by a common base 48. The lifters have substantially vertical edges or surfaces 50 facing the feed end of the belts, and flat, elongated upper surfaces or edges 52 normally occupying the lowered position of FIGS. 1 and 2 and below the support plane of the belts. The upper edges of the lifters define a common support plane for boards, which substantially parallels the support plane of the belts, when the lifters are raised to the raised position indicated by dashed lines in FIG. 2 and above the support plane of belts 20. Hoist mechanism also comprises a ram or fluid motor 54, having a stroke of fixed length, connected to the lifters and operable when actuated to raise and lower the lifters.

With reference to the support structure 16, this comprises a pair of elongated holders 56, 57 paralleling the upper runs of the conveyer and disposed one on one side and one on the other side of the conveyer. These define a bottom for the structure and constitute a yieldable holding means. Thus, the holders are mounted for pivotal movement about longitudinally extending axes on shafts 58. Such shafts accommodate movement of the holders from the lowered position illustrated to the raised position shown in dashed lines in FIG. 2. In moving between lowered and raised positions, lips or lumber-supporting portions 60, 61 pivot in arcs upwardly and away from each other. In their raised position, a layer of boards elevated by the lifters can pass between and beyond the holders. Gravity acts to return the holders to their lowered position after boards clear the same. The lowered position is determined by stops 62.

Also part of the support structure 16 are walls 64, 66 extending vertically upwardly from the support plane of the holders. These confine the ends of boards forming the stack in the apparatus. As will be described, the holders are constructed so that a tilt is imparted to a stack momentarily as boards are added to its bottom, and this tilt tends to shift boards toward wall 66 which functions as an end-aligning wall.

For moving a completed stack from support structure 16, an upright pusher means 80 extending in a vertical plane upwardly from the holders and set normally of the holders is included. This is mounted adjacent one set of ends of the holders. During the forming of a stack, pusher means 80 may assist in guiding one set of edges of boards in the stack. After a stack has been formed, pusher means 80 is shifted from right to left in FIG. 1, using ram or motor 86, which causes the stack to slide off of holders 56, 57 (with lips 60, 61 functioning as guides) onto mechanism such as a conveyer 84 which then removes the formed stack.

With particular reference now to FIGS. 2 and 3, when the lifters are shifted upwardly and first start their movement, boards positioned above surfaces 52 and resting on belts 20 (which will be referred to as a layer of boards to be added to the stack) are raised from the plane of belt runs 20a. On continued movement of the lifters upwardly the ends of the about-to-be-added layer of boards come into contact with the under surfaces of lip portions 60, 61. Further movement of the lifters upwardly causes these ends to pivot the holders with the lip portions of the holders swinging upwardly. With such swinging of the holders any stack resting on top of the lip portions also is shifted upwardly. It will be

noted that one of the lip portions is somewhat wider than the other. Thus, on the about-to-be-added layer moving upwardly, the shorter lip moves completely to one side of the ends of the boards in the layer being added to the stack before the longer lip does. This results in the stack above the lips being supported at one end only on one of the lips (the longer lip) and momentary tilting of the stack above the holders, as illustrated in FIG. 3. When the shorter lip moves free, the stack above the lips is supported at one end by the layer of boards being added, and at its other end by the longer lip. The tilt is toward wall 66, and this tilt is relied upon to promote end aligning of boards.

Explaining the operation of the device, with motor 30 running, boards as they are deposited on belts 20 travel from right to left in FIG. 1, with the lead board finally contacting stop means 40. Succeeding boards pile up behind the lead board, on the upper runs of the belts. When sufficient boards have collected to completely cover upper surfaces 52, ram 54 is actuated to raise the lifters. When the lifters are shifted upwardly, their bounding edges 50 extend vertically upwardly from the support plane of the belts, and these edges constitute abutment means preventing forward travel of boards toward the offbearing end of the conveyer beyond these edges.

The lifters are shifted upwardly until after the boards carried thereon have moved between and beyond the arcs of the holders, and this occurs at the end of the stroke of ram 54. With the boards on the lifters above the holders, the holders fall back to their lowered position. The lifters are then to be returned to their lowered position by contraction of ram 54. After their top surfaces move below runs 20a, boards building up as a backlog on the runs may move forwardly, and the cycle may then be repeated.

It will be noted that each layer of boards added to the stack requires the same extension of ram 54. The location where addition takes place is always at constant elevation.

It is claimed and desired to secure by Letters Patent:

1. Stacking mechanism for lumber comprising, a frame, means on the frame defining a path for boards with such boards traveling sidewise over and with ends on opposite sides of said path, opposed elongated holders mounted above and substantially paralleling said path, one on one side and one on the other side of said path, pivot means pivotally mounting the holders for movement between lowered and raised positions about axes substantially paralleling said path, said holders having lumber-supporting portions that project towards each other in a lowered position for the holders and that support the ends of boards in this position, said lumber-supporting portions swinging upwardly and away from each other in diverging arcs on pivotal movement of the holders from a lowered to a raised position, hoist means for lifting boards from said path and moving them between and then beyond said holders, said holders swinging from their lowered to their raised position to accommodate movement of boards therebetween and being constructed to return to their lowered position after boards move therebeyond, and end-aligning structure extending vertically upwardly from adjacent one of said holders constructed to align the ends of boards supported on said holders when such ends engage the structure, the lumber-supporting portions of said holders having a construction causing boards resting on the holders to tilt toward said end-aligning structure during movement of the holders from their lowered to their raised position.

2. In mechanism for stacking lumber, a frame, means on the frame defining a path of travel for lumber, elongated opposed holders substantially parallel to each other and disposed above said path of travel, said holders having lumber-supporting portions that normally occupy a lowered position and that in this lowered position extend towards each other and define a support plane for stacked

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lumber, pivot means mounting said holders for pivotal movement about longitudinally extending axes and accommodating movement of said lumber-supporting portions upwardly and away from each other to a raised position, hoist means for lifting lumber from said path of travel and moving such lumber between and then beyond said holders, aligning structure extending upwardly from adjacent one of said holders, said holders having a construction producing shifting of lumber thereon toward said aligning structure when they are raised from their lowered position, and means for removing lumber from said holders comprising ejector mechanism disposed above said holders and mounted for movement in a direction extending longitudinally of said holders.

3. In mechanism for stacking boards, elongated opposed holders substantially parallel to each other for holding the ends of a layer of boards, means mounting said holders enabling inner portions of the holders to

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swing up and away from each other, means for shifting a layer of boards upwardly from below said holders to above said holders, aligning structure extending upwardly from adjacent one of said holders, said holders having a construction producing shifting of boards toward said aligning structure when they are raised from their lowered position.

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