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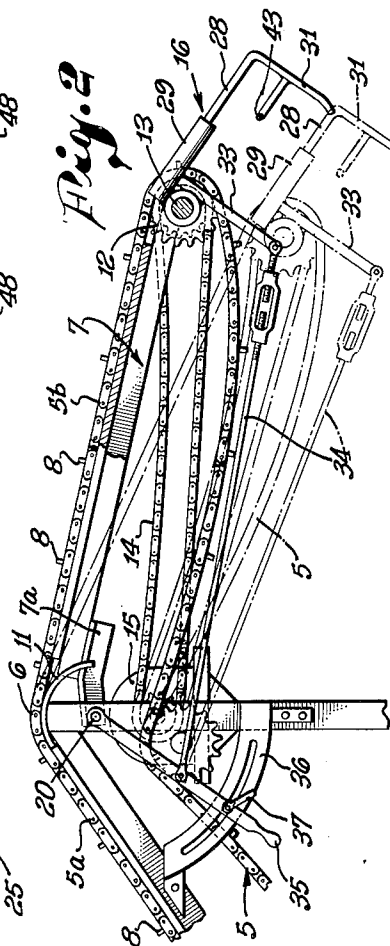
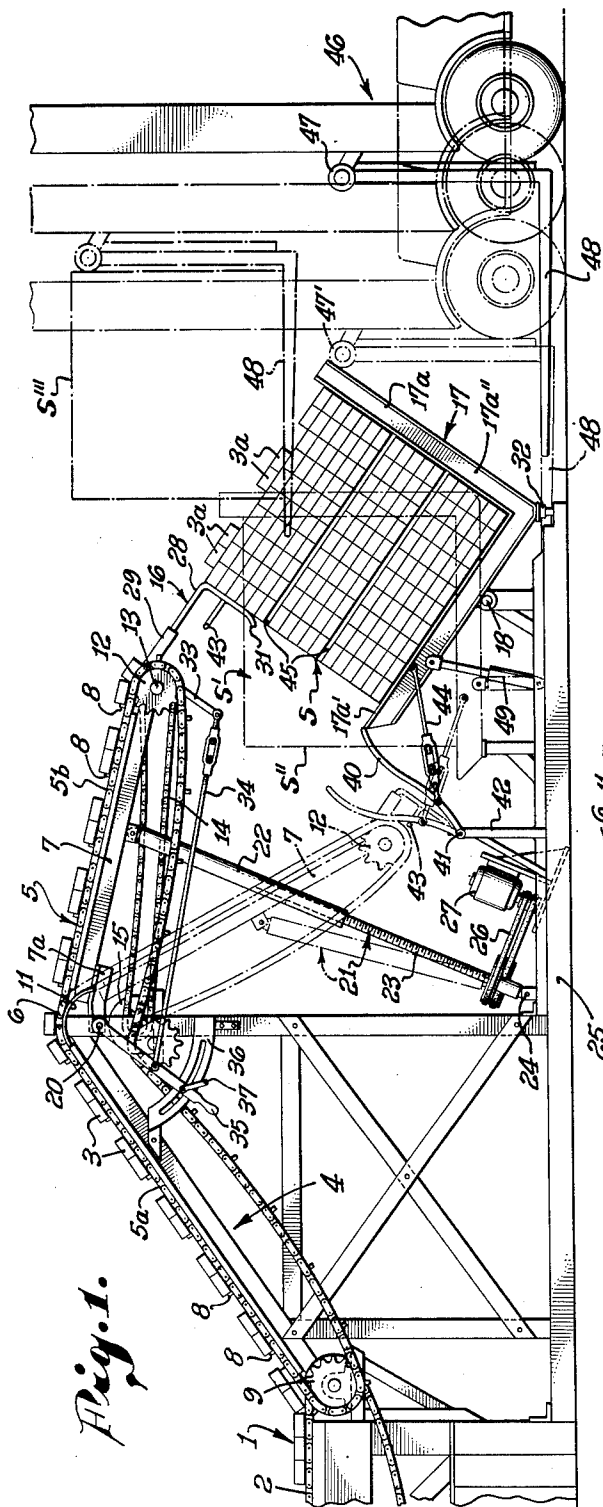
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2,658,630

LUMBER STACKING DEVICE

Filed Aug. 23, 1947

3 Sheets-Sheet 1



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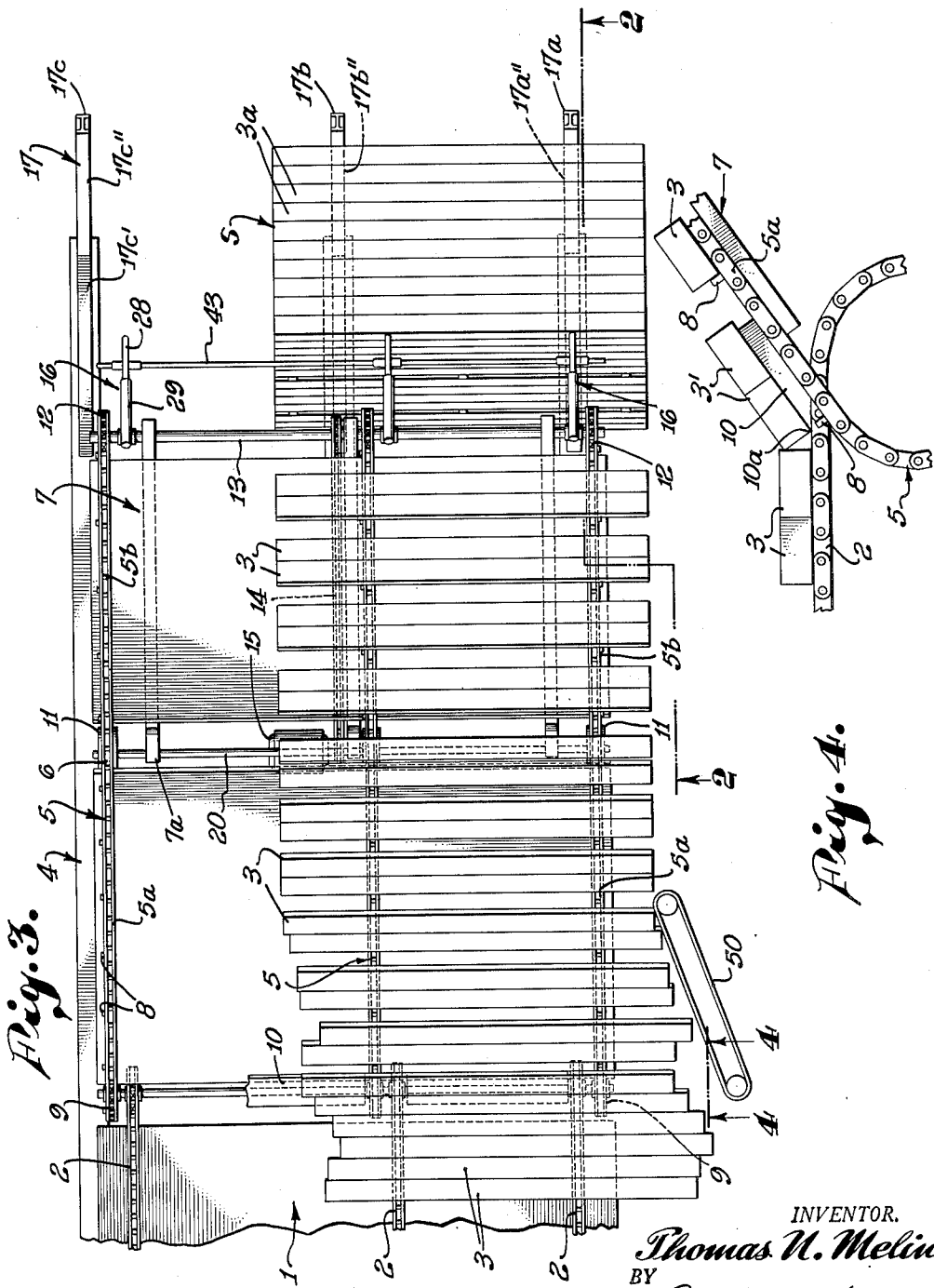


Fig. 4.

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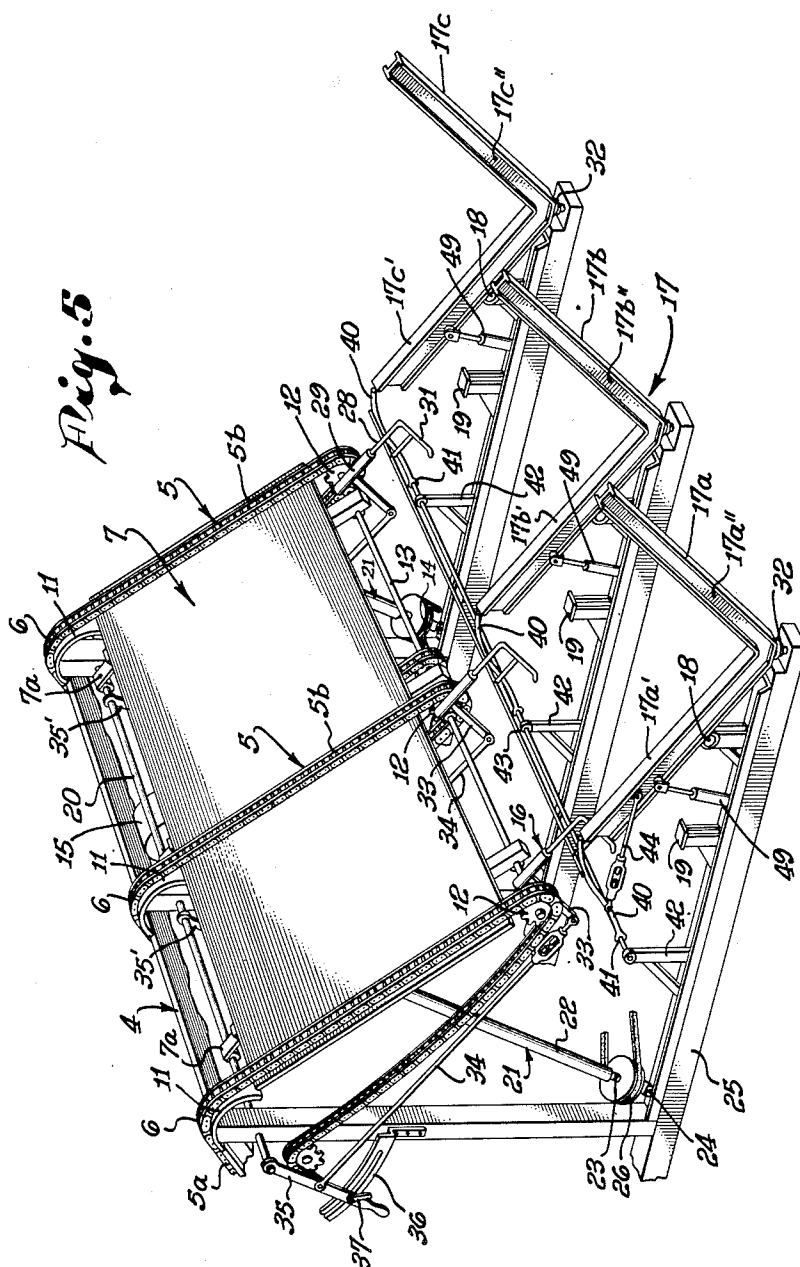
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LUMBER STACKING DEVICE

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11 Claims. (Cl. 214-6)

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This invention relates to apparatus for handling lumber and pertains particularly to apparatus for stacking lumber, either by "sticking" for kiln or air drying, or by "solid" stacking for storage, in a conveniently handled stack of normal proportions, in such manner that the stack is susceptible to a very facile handling for transport to another location in the mill or yard.

Numerous forms of apparatus for accomplishing the problem to which the apparatus of this invention is directed have been proposed from time to time, and while these prior proposed forms of apparatus have for the most part been quite successful in the handling of lumber which is relatively wide in relation to its thickness, such as the common dimension lumber, i. e., 1" x 6", 2" x 6", 2" x 8", 2" x 12" shapes, for example, particularly in "sticking" for kiln or other drying, considerable difficulty has in the past been experienced in the formation of "solid" stacks of the relatively common 2" x 3" and 2" x 4" shapes. The principal difficulty in the handling of these latter shapes appears to result from the fact that the shape is so nearly square in cross section that it has a marked tendency to roll rather than slide into the position in which it is to be disposed in the formed stack. In the formation of the stack it is customary and usually most convenient to deliver the boards in a direction normal to their length, with the greatest transverse dimension of the board arranged parallel to the plane of travel. In view of the above-mentioned definite rolling tendency, certain of the investigators in this art have relied upon the presence of the "stickers" which are disposed between each course of boards in the stack for the purpose of facilitating air circulation in drying operations. Inasmuch as these "stickers" are arranged in the direction of travel and may define relatively smooth slides over which the boards may move in each course, there is little danger of these difficultly handled shapes ever starting to roll when stickers are employed. However, in normal stacking for storage, termed "solid" stacking, no stickers are used except as an occasional binding sticker (as hereinafter disclosed), and for this reason little success has been attained by any prior suggested form of stacking apparatus in the formation of "solid" stacks.

Many expedients have been tried, but for the most part the problem of solid stacking boards such as 2" x 3"s and 2" x 4"s by automatic means have been abandoned in favor of manual handling, owing to the difficulties induced by too frequent stoppage of the apparatus for the pur-

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pose of straightening out snarls in the stacking operation.

In view of the above it is a principal object of this invention to provide a lumber-stacking apparatus which is adapted particularly for the handling of lumber shapes which are so nearly square in cross section as to ordinarily offer difficulty in handling from the standpoint of a tendency to roll rather than slide into stacked position, wherein provision is made for handling such difficultly stacked shapes in multiples of two or more as a unit, in edge-to-edge relation.

A further object of the invention is to provide a stacking device adapted to deliver, at a substantially constant delivery velocity, successive boards to a stack being formed, independent of the height of the stack at the instant of delivery of a board thereto.

In furtherance of the object immediately above set forth, it is also an important object of this invention to provide a stacking device adapted to deliver a plurality of boards in succession, in a direction normal to the length thereof, to a stack-forming rack member which is disposed in an inclined position such that each course of boards in the stack is located on an inclined plane, such delivery means being divided into two sections, one of which constitutes a first delivery section of variable angle as the stack height is altered during the stack formation, and the other of which constitutes a second delivery section of constant angle as the stack height is altered, over which the boards are delivered to the stack-forming rack.

A further object of the invention is to provide a lumber-stacking apparatus of the type set forth in which the first delivery section above described is provided with means for moving the boards thereover at a substantially constant rate independent of the variable angle of disposition thereof as the stack height is altered, so that the boards are delivered to the second delivery section at a substantially constant velocity independent of the stack height.

A further object of the invention is to provide a lumber-stacking device having a stack-forming rack member adapted normally to be positioned so as to cause the successive courses of boards which form the stack to be located in an inclined relation, such rack being mounted for pivotal movement out of its normal inclined position into erect position in which such courses are disposed substantially horizontally, in which latter position the removal of a formed stack from the rack is facilitated.

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In general, the above and other objects and features of this invention, hereinafter more particularly described, are attained in an apparatus which comprises, essentially, means defining a lumber-receiving rack upon which a stack of lumber is to be formed in an inclined relation with the successive courses of boards arranged in parallel planes which are inclined to the horizontal in one direction, and means for delivering the boards to said rack at various heights for the purpose of establishing the successive courses, such delivering means comprising two delivery sections, the first of which is provided with means which will cause the boards to be moved toward stacking position at a substantially constant velocity independent of the height of the stack being formed and for constraining such boards to such constant velocity movement, and the second of which is adapted to receive boards delivered thereto by the first delivery means and to discharge such boards by gravity along an inclined path consonant with the plane of the particular course of boards being formed upon the stack, together with means for raising and lowering the delivering means to adapt the same to the formation of the successive superimposed courses. In order to facilitate the delivery of a formed stack from the stacking apparatus, the stack-receiving rack is preferably mounted for pivotal movement out of the normal position above set forth into an erect position in which the board courses in the stack are disposed substantially horizontal, such rack being preferably gravity-biased into such normal inclined relation.

The above and other objects and features of this invention will be brought out in the ensuing specific description of one embodiment thereof, or will be apparent therefrom, having reference to the accompanying drawings in which:

Fig. 1 is a partly broken away side elevation of an apparatus according to this invention showing boards being delivered to a nearly completed stack, in full lines, with alternative positions of the stack and stack-forming rack as would be adopted in the removal of a formed stack from the apparatus being shown in dot-dash lines;

Fig. 2 is a fragmentary detail thereof on enlarged scale showing alternative positions of the board-delivering portion of the structure in different operating positions, as taken on line 2—2 of Fig. 3;

Fig. 3 is a fragmentary plan view of the structure shown in Fig. 1, corresponding to the full-line showing therein;

Fig. 4 is a detail taken on line 4—4 in Fig. 3; and

Fig. 5 is a fragmentary perspective view of the board-delivering means and the stack-forming rack structure in a position corresponding to the start of a stack-forming operation.

Referring to the drawings, the delivery end of a sorting table is indicated at 1, provided with a plural conveying chain structure 2 along which a series of boards 3 are delivered to the stacking apparatus. As a continuation of the conveying chain structure 2 I provide an elevating conveyor structure 4 which is illustrated as comprising a part of the stacking mechanism but which may equivalently be constituted as a part of or continuation of the conveying chain structure 2, inasmuch as the stacking structure per se is intended to operate upon boards which have been delivered thereto at an elevation somewhat above the maximum height of the stack which is to be

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formed. As is specifically illustrated, the elevating conveyor 4 may comprise a plural conveying chain assembly 5 having an elevating run 5a extending from the delivery end of the chain assembly 2 to an elevated intermediate position 6 thence over a pivotally mounted delivery section 7 as at 5b. The conveying chain assembly 5 is provided with a plurality of spaced driving spurs 8 which are preferably separated a distance in excess of a multiple of two or three widths of the boards to be handled in the stacking operation. In the illustration, these driving spurs are shown to be located in excess of two widths of the boards 3 which are being stacked, such boards corresponding, for example, to conventional 2" x 4"s. The conveying chain assembly is conveniently formed of two or three transversely spaced chains, carried on tail sprockets 9 at the delivery end of the chain assembly 2, supported on an arcuate slide member 11 at the position 6 and upon head sprockets 12 at the discharge end of the delivery section 7. Means are provided for driving the conveying chain assembly, and for this purpose, the shaft 13 on which the head sprockets 12 are mounted may be provided with a chain drive 14 operated by a gear-reduction motor 15.

Pivotally mounted on the shaft 13 I provide a second delivery section 16 which is adapted to receive the boards 3 which are delivered from the delivery run 5b of the chain assembly 5 and guide the same along an inclined path toward a stack-forming rack 17. The stack-forming rack may be comprised of a plurality of normally inclined angle support members 17a, 17b and 17c having bottom guide rail portions 17a', 17b' and 17c' defining a lumber-receiving platform arranged in an inclined plane, and side guide rail portions 17a'', 17b'' and 17c'' which are preferably perpendicular to the plane defined by the bottom guide rail portions and are adapted to define one side of the formed stack. The rack formed by the members 17a, 17b and 17c is preferably adapted for pivotal movement out of the normally inclined full-line position into the dot-dash line position (Fig. 1), and to this end the bottom rail members 17a', 17b' and 17c' may individually be pivotally mounted as at 18, at a position such that the unloaded rack members will normally be gravity-biased into the inclined position of Fig. 5 as a result of the weight of the side rail portions 17a', etc. The location of the pivots 18 is so selected, furthermore, that the center of gravity of a formed stack S will be to one side of the pivots when in the inclined position shown in full lines in Fig. 1 (i. e., the low side, towards the lowered portion of the rack) but will be to the other side of the pivots when the stack is pivoted nearly to the erect position S', the resultant shift in the center of gravity serving to cause the stack to move into the erect position S' under its own weight if moved nearly into such erect position by rotation of the stack as a body about the pivots 18. Post members 19 are provided to engage the bottom rail members when the rack is disposed in the erect dot-dash line position of Fig. 1, so as to locate the bottom rail members in a substantially horizontal plane.

The delivery section 7 may be mounted as upon brackets 7a for pivotal movement about an axis adjacent the intermediate portion 6, such as defined by a shaft 20 which may also define the center for the arcuate slide members 11. Means are provided for raising and lowering the outer or head sprocket end thereof, which means may conveniently comprise a pair of extensible sup-

port posts 21, one at each side of the device, which may be formed as a tubular post member 22 carrying an elongated screw member 23 threadedly mounted at one end thereof and rotatably and pivotally mounted as at 24 upon the base 25 of the structure. The screw members 23 are adapted to be rotated concurrently to secure the desired raising and lowering of the delivery section 7, and for this purpose may be provided with a belt drive 26 connected to a common drive motor 27 (Fig. 1 only) which may be employed to raise the extensible post structures at each side of the delivery section in unison.

The second delivery section may comprise a telescoping extension section such as a slide 28 slidably disposed in a support tube 29, such slide 28 being mounted for free movement within or upon the support 29 so as to slide outwardly with respect thereto under the influence of gravity, the slide and support being normally disposed at a sufficient angle to the horizontal as to cause such outward movement in use of the apparatus. The slide 28 is preferably provided with a depending arm portion 31 which is adapted to ride along the face of the stack S (Fig. 1) as the stack is formed, being positioned against the stack by gravity. The normal disposition of the depending arm member 31 in physical contact against the adjacent edge of the stack being formed (as may readily be observed in Fig. 1) serves to locate the second delivery means in a condition of immediacy with respect to the stack, so that the boards delivered thereby will have no opportunity to become cocked out of their plane of delivery and then start to roll along the already formed course of boards on the rack 17.

The inclination of the stack S as defined by the rack 17 is preferably adjusted so that the boards 3a which are delivered thereto by the second delivery section 16 will slide freely along each already-formed course of boards in the stack. This inclination is ordinarily in the neighborhood of about 35°, and is subject to minor adjustment through the agency of screw posts 32 against which the forward ends of the rack portions 17a, etc., may rest. The inclination is so selected that the boards will slide freely, as above described, without attaining any greater velocity than is required for this free sliding. Excessive velocity of movement of the boards over the subjacent course will accentuate the tendency for the boards to roll and thus become dislocated from their proper position. Means are preferably provided to locate the second delivery section 16 in substantial parallelism with the inclination established by the rack 17, and to this end the delivery section 16 may conveniently be pivotally mounted for rotative adjustment in position about the shaft 13, through a parallelogram position-adjusting structure defined by a depending arm member 33, a connecting link 34 and an adjustment arm 35 pivoted on the shaft 20 and engageable upon a fixed positioning quadrant 36 through lock means 37. Separate delivery sections 16 are preferably provided at a position adjacent each of the head sprockets 12, and the parallelogram linkages for the several delivery sections 16 are preferably integrated for concurrent adjustment, as by providing separate connecting links 34 for the respective depending arm members 33, respectively secured to adjustment arms 35' corresponding to that shown at 35 and mounted on the shaft 20. Rotation of the shaft 20 by means of the arm 35 will thus adjust

the angularity of the sections 16 in a simultaneous manner.

In the use of the device for stacking lumber, the rack 17 is first adjusted to the angle which has been found best for the type of boards which are to be stacked, by adjustment of the screw posts 32, and the delivery section 7 is placed in a lowered position such that the second delivery section 16 will be located to deliver the boards to the bottom rail portions 17a', etc., of the rack 17. This position is illustrated in Fig. 5, and in view of the fact that there is no first course of boards present upon the bottom rails 17a', etc., at this stage of the operation, there is no restraint thereby upon the depending arm portions 31 of the slides 28. In order to locate the slides in a sufficiently retracted position as to clear the first course of boards after formation thereof upon the bottom rails 17a', etc., I preferably provide a constraining linkage therefor which may comprise a plurality of guard members 40 pivotally supported at their lower ends 41 upon posts 42 and adapted to engage a transverse guard rail 43 extending across the device and secured to the respective depending arm portions 31 of the slides 28. A linkage is established between the guard members 40 and the rack 17 as at 44 for the dual purpose of limiting the forward movement of the guard members 40 to properly position the depending arm portions 31 when the rack is in the normal position of Fig. 4, and for retracting the guard members to a rearward position which will carry the slide members 28 to a fully retracted location clear of the location of the rearward face S'' of the stack S when it is in erected position (see dot-dash position S', Fig. 1).

With the delivery section 16 disposed in the position of Fig. 5, in alignment with the bottom rail portions 17a', etc., of the rack 17, and with the parallelogram inclination adjusting means 33-37 properly located to dispose the slide members 28 at an inclination substantially parallel with that of the bottom rails of the rack, the motor 15 may be energized, causing the boards 3 to be carried along the run 5a, in which relation the driving spurs 8 lift the boards 3 along the run 5a, and the boards are carried over the elevated intermediate position 6 onto the run 5b of the conveying chain assembly 5. In the starting position, the inclination of the delivery section 7 being rather great, the spurs 8 serve to constrain the downward movement of the boards along run 5b to conform to the velocity of travel of the chain assembly 5. When the boards are delivered at the head sprockets 12 onto the second delivery section 16 they are relieved of the constraining influence of the spurs 8 and allowed to fall freely along the slides 28 and upon the bottom rails 17a', etc., of the rack 17, in the formation of the first course of boards.

As soon as the first course of boards is completed the operator energizes the motor 27, raising the pivoted delivery section 7 to a height corresponding to the thickness of the first course of boards, and the next succeeding boards delivered by the delivery run 5b of the conveyor chain assembly will be imposed upon the first course. As pointed out above, the spacing of the spurs 8 is preferably established so as to be adapted to receive a plurality, said two or three, boards as a unit, so that these boards are delivered in pairs, for example, as shown at 3b in Fig. 1. It has been found that when a pair of boards are delivered in edge-to-edge relation they more nearly have the stability characteristics of a larger board, say

a 2" x 8" board, and will slide into place without exhibiting the unruly characteristics of a single board. This delivering in multiples in edge-to-edge relation serves also to increase the stacking rate inasmuch as two or three boards when supplied as a unit can slide over any obstacle that a single board can slide over, and in substantially the same amount of time.

In order to insure that the boards 3 will be picked up evenly by the spurs 8 (which will be located in transversely aligned relation on the parallel chains of the plural chain assembly 5), i. e., so that the boards will be carried up the elevating run 5a with their major axes normal to the direction of travel, I preferably provide a feeding ledge 10 extending upwardly along the slope of the ascending run 5a of the chain assembly 5 at the discharge end portion of the conveyor chains 2. The location of this guide ledge 10 is more readily apparent in Figs. 3 and 4, and is preferably of such length in the direction of travel of the boards 3 as to concurrently support a group 3' of boards equal in number to that provided for by the spacing of the spurs 8. The boards 3 on the conveyor 2 are crowded against the ledge in an edge-to-edge compacted relation, resulting from the back-accumulation of boards on the conveyor, and pile up on the ledge 10 as shown in Fig. 4, from whence they are pushed as a group onto the ascending run 5a of the conveyor 5. The spurs 8 are of less height than the thickness of the ledge 10, wherefore they do not engage the boards of group 3' until after such boards have left the ledge. The intersection of the upper plane of the conveyor 2 with the upper surface of the ledge 10, indicated at 10a (Fig. 4 only), being disposed normal to the direction of travel of the boards along the conveyor 2, serves to straighten the transverse alinement of any board which meets this line of intersection 10a at an angle to such normal, inasmuch as the shoulder formed by the ledge 10 at this intersection 10a will restrain a leading corner of such a board until the lagging corner has caught up with it, and both ends of the board will slide up along the ledge 10 simultaneously, with its major axis normal to the direction of travel.

As the successive courses of boards are laid upon the rack 17, which can be accomplished without interruption of operation of the conveying chain assembly 5 if the operator having control of the motor 27 is sufficiently adept, the pivoted delivery section 7 is raised about the shaft 20 higher and higher, decreasing its inclination progressively, while the inclination of the second delivery section 16 remains constant at the value pre-established by the operator. At some point in the raising of the delivery section 7, the frictional drag of the boards on the chain will overcome the tendency for the boards to slide along the chain by gravity, and the spurs 8 will act (as in Fig. 1) as positioners rather than retarders, still delivering the boards over the head sprocket position, however, at the established velocity of chain travel.

It will be noted that in Fig. 1 I have illustrated the stack S as provided at two levels with transversely extending "stickers" 45, and it is to be emphasized that these stickers are employed for the purpose of imparting stability to the stack in the subsequent operations of handling the stack in the yard, rather than for the purpose of separating the individual courses to facilitate the stacking operation, as has been required in the utilization of many forms of prior described

types of lumber-stacking apparatus. I may, of course, provide "stickers" between each course, where a fully "stickered" stack is desired, as is practised where the stacked lumber is to be subjected to a drying operation.

When the desired height of stack has been attained (as may be limited for example by the length of the side rails 17a', etc.), the motor 15 is stopped, and the pivoted delivery section 7 carrying the delivery section 16 is retracted to a lowered position such as is shown in dot-dash lines in Fig. 1, by operation of the motor 27, the motor 27 being stopped at a desired lowered position of the device by conventional "limit switch" means, as will be apparent, bringing the transverse guard rail 43 into engagement with the guard members 40 (the latter being then in the full line position in Fig. 1). A lift truck 46 is now brought into position to tilt the rack 17 counterclockwise about the pivots 18 to the dot-dash position of Fig. 1 (suitable bumper members 47 being provided on the lift truck to engage upon the side rails 17a', etc., as shown in dot-dash lines at 47' in Fig. 1), after which further movement of the lift truck produces the desired pivotal movement of the rack 17. The lift truck 46 is provided with a hoisting fork 48 which is adapted to enter between two adjacent rack members 17a and 17b for example and engage upon the lower surfaces of the stack as defined by the bottom course of boards. The hoisting fork may be raised as the rack is pivoted counterclockwise into erect position. The center of gravity of the stack S, when shifted to the left of pivots 18 by the lift truck 46, will cause the loaded rack 17 to move to the dot-dash position S' of Fig. 1, and a hydraulic dash-pot member 49 is preferably provided for each of the rack members 17a-17c to prevent a too rapid final pivotal movement of the rack into erect position. This gravity-biased final movement of the stack into S' position is desirable from the standpoint eliminating the necessity for the operator of the truck 46 to push the rack into the erect position, an operation which would be quite difficult to perform with precision. After the stack has been moved into erect position it may be hoisted away by the lift truck, as to the dot-dash position S'' in Fig. 1, and the lift truck may be backed away as the stack is raised to a height sufficient to clear the upper ends of the side rails 17a', etc., it being appreciated that the rack 17 will start its clockwise return movement to its normal inclined position as the stack is lifted off the bottom rails 17a'. During the counterclockwise movement of the rack 17 to erect position, the link members 44 retract the guard members 40 to the dot-dash position of Fig. 1, removing the slide members 28 of the delivery section 16 out of position where they may be detrimentally engaged by the stack or the lift truck forks. As soon as the rack 17 returns to normal or inclined position the motor 27 may be energized to bring the delivery mechanism to the starting position of Fig. 5 and a further supply of boards may be delivered to the stacking rack, even before the stack S has been removed from over the position of the rack 17. The lift truck 46 may be employed to remove the lumber stack to any desired position in the yard, and it will be appreciated that the time lost in bringing the lift truck into position beneath the stack and lifting the stack from the rack is but nominal, it being in the case of skilled operators the matter of only a few seconds, wherefore the actual productive time of the

apparatus in the stacking function represents a very large portion of the complete stacking and unloading cycle.

In Fig. 3 I have shown but two of the conveyor chains 5 in use, and only the rack portions 17a and 17b being utilized for the formation of a stack. This will be the usual case where relatively short board lengths are being stacked, and the third conveyor chain assembly and the third rack member 17c may be employed when the length of boards is sufficient to justify their use. It will also be noted from Fig. 3 that I provide an aligning device 50 such as a power-driven guide belt assembly (power means not shown) which is adapted to engage one end of the boards 3 as they ascend the elevating run 5a, in order to establish a fair degree of neatness in the formed stack. It will be appreciated that the opposite ends of the boards will not always present an even line such as is represented by the idealized showing in Fig. 3, inasmuch as the board length will not ordinarily be quite this uniform, and it is not intended that my device be restricted to the handling of boards of the delineated uniformity. As a matter of fact, the device is equally useful in stacking uniform or random length boards.

It will further be appreciated that the control means for the motors 15 and 27 may be carried by the operator, through the agency of extension cables, who may walk about the apparatus as it is being utilized in the stacking operation, and who may be relied upon to insert the occasional stickers 45 at suitable intervals.

The above-described form of apparatus is to be taken as illustrative only, and not as limitative upon my invention. Numerous modifications in the specific details of construction, as applied to specific utilizations of my broad concept, will occur to those skilled in the art, wherefore I consider the scope of my invention to be that encompassed within the subjoined claims rather than within the narrow confines of the specific form of the invention herein delineated and described.

I claim:

1. In a lumber-stacking apparatus, the combination which comprises: means defining a lumber-receiving rack upon which a stack is to be formed, said means defining a platform arranged in an inclined plane; means for delivering a plurality of boards to said rack in an inclined plane substantially parallel to said first-named inclined plane, said last-named means including a delivery member adapted for physical engagement upon the adjacent edge portion of the stack being formed, whereby the inclined plane of delivery of such boards is maintained substantially unchanged up to the point of delivery of such boards into stacking position; and means for elevating said delivering means to cause the same to deliver boards to the position of said rack in successively elevated planes substantially parallel to said first-named inclined plane.

2. In a lumber-stacking apparatus, the combination which comprises: means defining a lumber-receiving rack upon which a stack is to be formed, said means defining a platform normally arranged in an inclined plane, and being mounted for pivotal movement out of such normal inclination into an erect position to dispose said platform substantially horizontally; means for delivering a plurality of boards to said rack in a successive plurality of spaced inclined planes substantially parallel to said first-named inclined plane and at a substantially constant velocity at

all planes; and means for pivotally mounting said delivery means to raise and lower the delivery end of the delivery means relative to said platform.

3. In a lumber-stacking apparatus, the combination which comprises: means defining a lumber-receiving rack upon which a stack is to be formed, said means defining a platform normally arranged in an inclined plane, and being mounted for pivotal movement out of such normal inclination into an erect position to dispose said platform substantially horizontally; and means for delivering a plurality of boards to said rack in a successive plurality of inclined planes substantially parallel to said first-named inclined plane and at a substantially constant velocity, said delivering means including a first delivery section of variable inclination and a second delivery section pivotally secured to said first delivery section at the delivery end thereof, and means for maintaining said second delivery section at an inclination parallel to said first-named inclined plane at all inclinations of said first delivery section.

4. The combination set forth in claim 3, and comprising in addition, means for varying the normal inclination of said rack, and means for varying the inclination of said second delivery section relative to said first delivery section.

5. In a lumber-stacking apparatus, the combination which comprises: means defining a lumber-receiving rack upon which a stack is to be formed, said means defining a platform arranged in an inclined plane; means for delivering a plurality of boards to said rack in an inclined plane substantially parallel to said first-named inclined plane, including a first delivery section having a delivery end movable upwardly and downwardly so as to be positioned to convey boards toward said rack at any one of a plurality of different levels, and a second delivery section secured to said first delivery section at said delivery end to receive boards therefrom and deliver the same to said rack position; and means for maintaining said second section in an inclined position of substantially constant inclination in all delivery positions of said first delivery section.

6. A construction as set forth in claim 5, said second delivery section including a relatively fixed portion mounted on said first delivery section and a relatively movable portion carried by said relatively fixed portion, said relatively movable portion being biased outwardly of said relatively fixed portion toward the position of said rack; and comprising in addition, limit means positioned to engage said relatively movable portion of said second delivery section and position the same in immediate adjacency to the platform of said rack, whereby the boards delivered by said second delivery section are caused to be supported by said relatively movable portion thereof up to the point of delivery of said boards to said platform.

7. A construction as set forth in claim 6, said relatively fixed portion of said second delivery section being provided with depending guide arm means positioned for engagement upon the adjacent edge of a course of boards supported by said rack at one of said levels when said second delivery section is positioned for delivery of boards into stacking position at a level above said one level.

8. In a lumber-stacking apparatus, the combination which comprises: means defining a lumber receiving rack upon which a stack of lumber is to be formed, said means defining one edge of

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the stack and also a platform disposed in an inclined plane and on which the stack of lumber is formed; delivery means for delivering a plurality of boards to said rack at a substantially constant velocity in successive ones of a plurality of substantially parallel spaced planes, all of said planes being substantially parallel to said inclined plane; and means for raising and lowering the delivery means relative to the platform; said rack including means pivotally mounting the rack to swing about a horizontal axis between a normal position in which the platform is inclined and an erect position in which the platform is substantially horizontal, the axis being located adjacent the platform and below the stack; the proportions of said rack being such as to define a lumber stack of which the center of gravity is located at the side of a vertical plane passing through said pivotal axis toward said one edge of the stack when the rack is in loaded condition and is in normal position, and the center of gravity is located at the opposite side of said vertical plane when the rack is in loaded condition and is in erect position, the center of gravity of the stack shifting from one side of the vertical plane to the other upon pivotal movement of said rack and the stack thereon from the normal position to the erect position.

9. A lumber stacking apparatus, the combination which comprises: means defining a lumber receiving rack upon which a stack is to be formed, said means defining a platform arranged in an inclined plane; delivery means for delivering a plurality of boards to said rack in an inclined plane substantially parallel to the inclined plane of said platform, the delivery means comprising a first delivery section having a pivotally mounted receiving end and a delivery end movable upwardly and downwardly so as to be positioned to convey boards towards said rack at any one of a plurality of different levels, and a terminal delivery section pivotally secured to the first delivery section at the delivery end thereof to receive boards therefrom and deliver them to the rack; means for elevating delivery means to deliver boards to the rack in successive elevated spaced planes each substantially parallel to the inclined plane of said platform; and means for maintaining said terminal section of the delivery means in an inclined position of substantially constant inclination in all delivery positions of the first delivery section.

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10. In a lumber stacking apparatus, the combination which comprises: means defining a lumber-receiving rack upon which a stack is to be formed, said means defining a platform disposed in an inclined plane; delivery means for delivering a plurality of boards to said rack, said delivery means including a first delivery section pivoted at its receiving end to swing its delivery end up and down to convey boards to the said rack at a plurality of different levels and a terminal delivery section pivoted to the first delivery section at the delivery end thereof to receive boards and deliver them to the rack, said first delivery section including continuously moving board moving means positively engaging successive boards to move them at a predetermined speed over the first delivery section and said terminal section having linearly extending surfaces that support each board immediately before and at the time of its delivery to the rack in a plane substantially parallel to the inclined plane of said platform; means for elevating said delivery means to cause delivery of boards to the position of the rack in successive spaced planes; and means for maintaining said terminal delivery section inclined downwardly toward said stack at a substantially constant inclination at all delivery positions of said first delivery section to maintain said successive planes substantially parallel to the first mentioned inclined plane.

11. The combination as in claim 10 in which the terminal delivery section includes a member engageable with the adjacent edge of the stack at all elevated positions of the delivery means to eliminate any spacing between the stack and the delivery means and to direct the boards until delivery to the stack.

THOMAS N. MELIN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
802,229	Moses	Oct. 17, 1905
1,109,062	Harjes	Sept. 1, 1914
1,128,671	Evans	Feb. 16, 1915
1,135,146	Strickland	Apr. 13, 1915
1,325,074	Bradney et al.	Dec. 16, 1919
1,432,086	Plonka	Oct. 17, 1922
2,065,674	Fay	Dec. 29, 1936
2,127,670	Backus	Aug. 23, 1938
2,165,918	Black	July 11, 1939