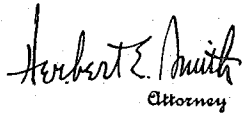


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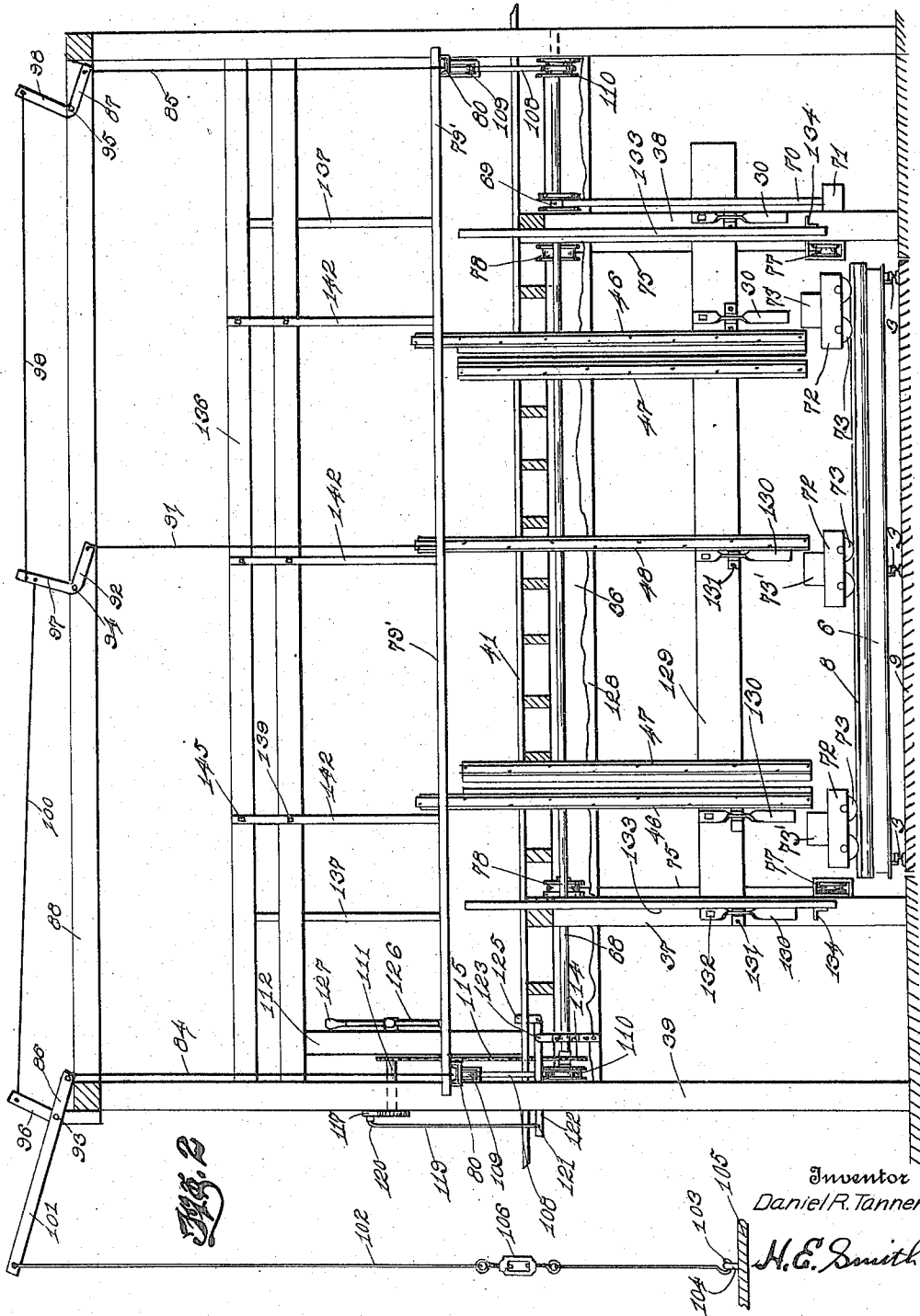
4 SHEETS--SHEET 1.



D. R. TANNER.
LUMBER STACKER FOR KILN DRYING.
APPLICATION FILED SEPT. 30, 1915.

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Patented Mar. 27, 1917.
4 SHEETS—SHEET 2.



Inventor
Daniel R. Tanner
H. E. Smith

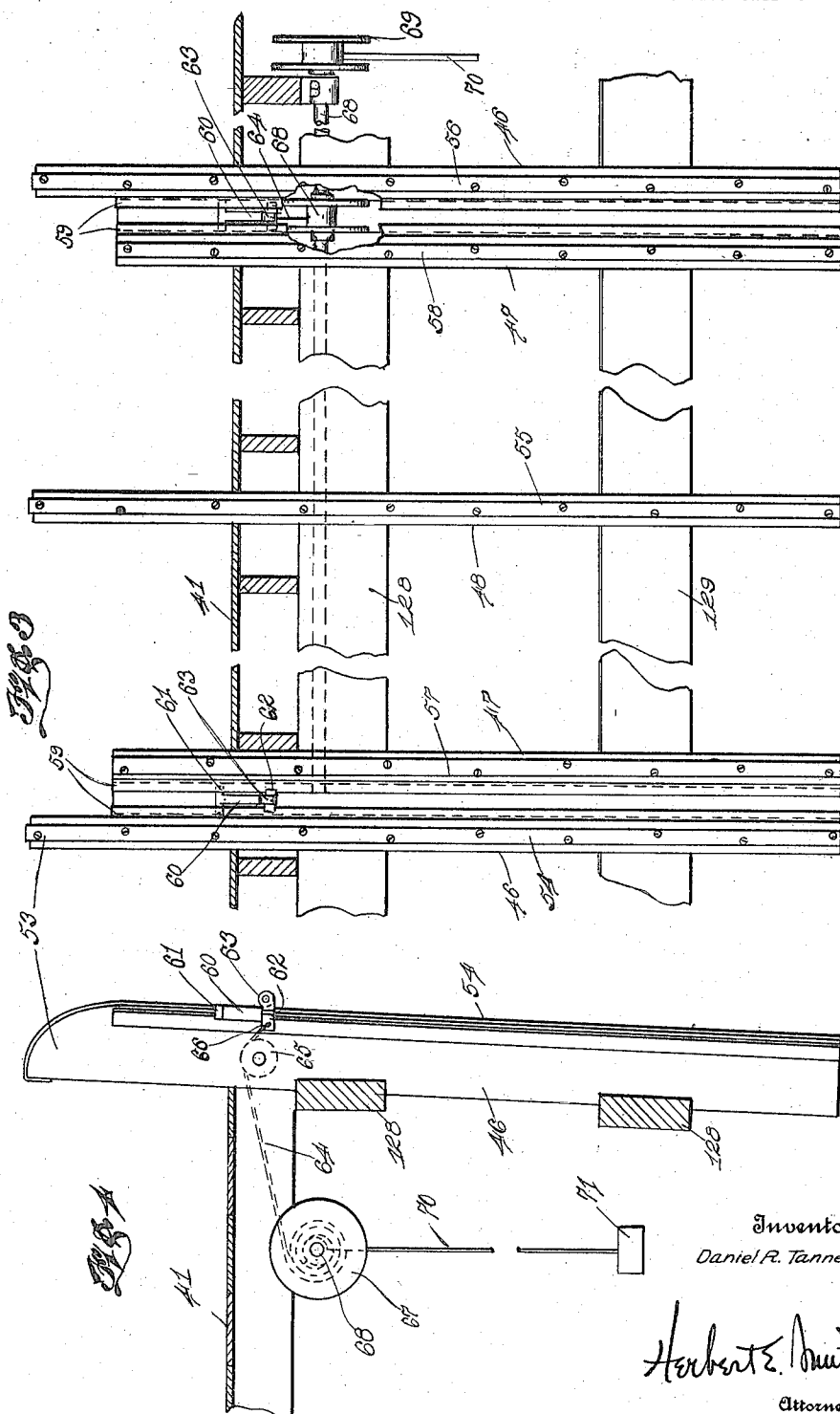
Attorney

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4 SHEETS—SHEET 3.



Inventor
Daniel R. Tanner

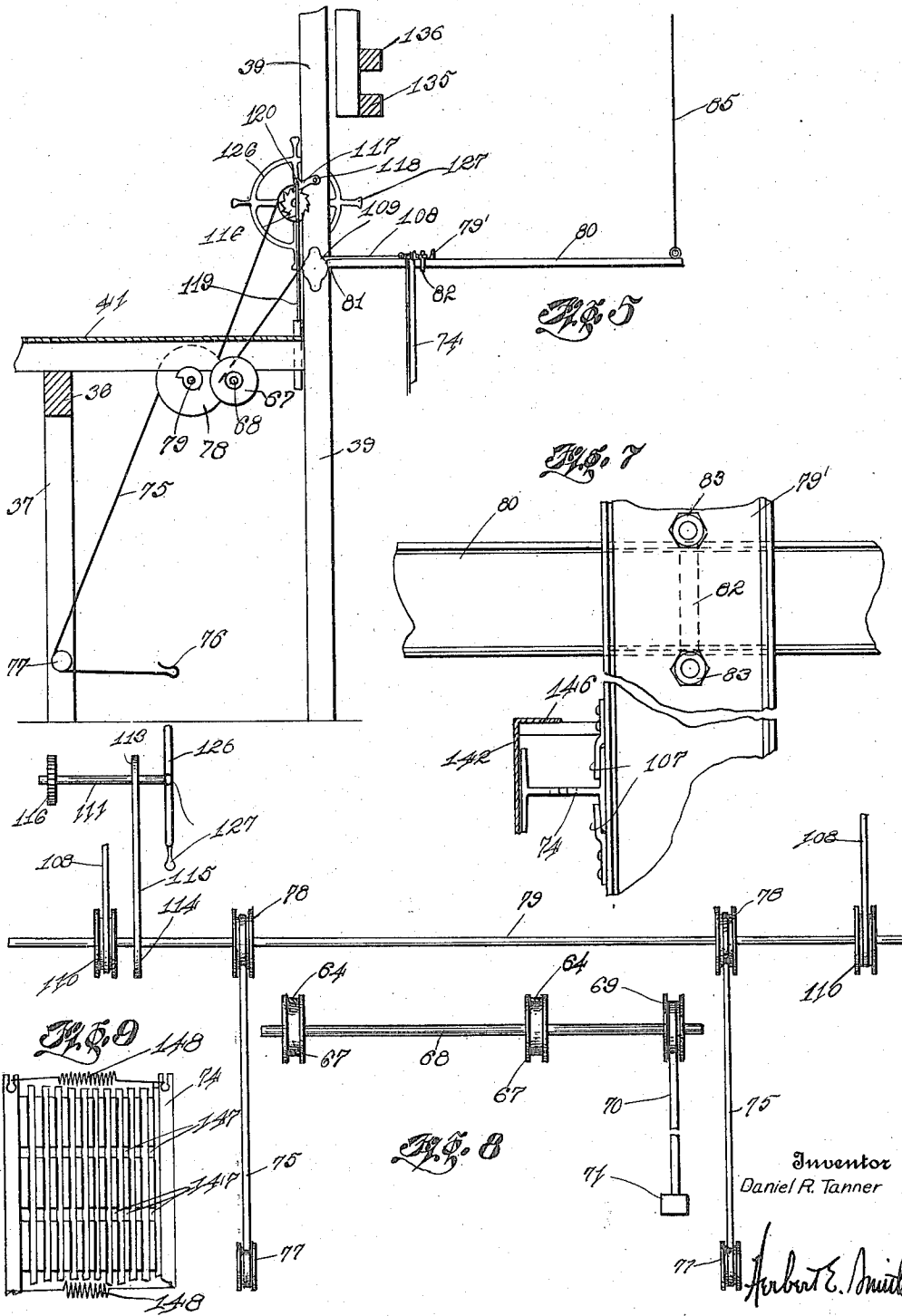
Herbert E. Smith
Attorney

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Patented Mar. 27, 1917.

4 SHEETS—SHEET 4.



Inventor
Daniel R. Tanner

Herbert E. Smith
Attorney

UNITED STATES PATENT OFFICE.

DANIEL R. TANNER, OF LA GRANDE, OREGON.

LUMBER-STACKER FOR KILN-DRYING.

1,220,798.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed September 30, 1915. Serial No. 53,346.

To all whom it may concern:

Be it known that I, DANIEL R. TANNER, a citizen of the United States, residing at La Grande, in the county of Union and State of Oregon, have invented certain new and useful Improvements in Lumber-Stackers for Kiln-Drying, of which the following is a specification.

This invention relates to improvements in lumber stackers and has to do more particularly with mechanism of this character for stacking lumber on edge.

It is one of the objects to provide an improved mechanism and method for stacking lumber on edge in such a manner that each tier of lumber will be stacked and maintained under pressure, during the stacking operation, the pressure being retained at the completion of the stacking operation, tier against tier, so that after the carrier is in the kiln and the boards have shrunk, they will be held in spaced relation so as to be subjected to drying action on all areas thereof. The result of this improved mechanism and method greatly shortens the period of kilning and thereby materially increases the capacity of the plant.

A further feature of my invention consists in providing means whereby stickers may not only be inserted at desired points over the carrier, but also, at endwise points beyond the carrier and near the ends of the boards irrespective of the extent of projection of the ends of the boards beyond the carrier. The result and advantage of this feature is that "edging" of the board inwardly from the ends, will be restricted to the points of location of the end-most stickers and the latter may be disposed as near as one inch inside of the ends of the lumber load, the stickers being held in place because of the pressure to which the load is subjected, and not being otherwise supported.

A further feature of the invention consists in providing a carrier with means whereby the latter is held in predetermined positions abreast of the stacker, during the loading operation, and gradually moved past, through, or under the stacker as the carrier is being loaded, this feature of my invention being preferably embodied in a stacker which is inclined with respect to the vertical, together with means for correspondingly inclining the carrier for gravity

movement of the carrier to or away from the stacker during the loading operation.

A further feature of my invention consists in providing means for restricting gravity movement of the carrier away from the loader, during the loading operation, and in providing means for supporting a portion of the load of the carrier, such load supporting means being releasable gradually during the loading operation, synchronously with the gradual release imparted to the carrier.

A further object and feature of this invention is to provide means for controlling the descent of lumber, in built-up tiers, from the stacker onto the carrier, so as to avoid sticking of one end of a board, especially the first board dropped, thereby compelling the operator to stamp down the elevated or stuck end into a horizontal position with respect to the remaining end. The device of my invention provides for the dropping of boards onto counter-weighted carriers which descend as the tier is built up and allow the tier to lower into position onto the carrier.

My invention also includes novel sticker and stake guards for coaction with the stickers and stakes to form a continuing surface of abutment for the boards to be loaded so that the boards will not strike on the upper ends of the stickers or stakes as they are loaded onto the carrier. This improved feature also embodies yielding sticker holders for maintaining pressure on the last stickers inserted next to the stacker, during the loading operation. My invention also includes means for exerting pressure on the upper and lower ends of each sticker during the loading operation.

A very important feature of my invention consists in providing a lumber carrier which is movable on its own wheels from the rear of the stacker, past, through or under the stacker during the loading operation, and thence forwardly of the stacker toward the point of next deposition, which may be the kiln, said carrier moving all in one general direction. In this connection, I may say that this feature is preferably embodied in a construction whereby the carrier is run on its own wheels, in a lumber empty condition, along incoming transport tracks, the carrier being transferred from the transport tracks to a transfer car which is run

underneath the stacker, and after the carrier is loaded, the said transfer car advances the loaded carrier to outgoing transport tracks from whence the carrier may be advanced toward the kiln.

Other features and objects of the invention, both as a method and as an apparatus, will be more fully described in connection with the accompanying drawings and will be more particularly pointed out in and by the appended claims.

In the drawings:—

Figure 1 is a vertical transverse sectional view of my improved stacker showing the lumber carrier in the position which it would assume during the stacking or loading operation.

Fig. 2 is a face view of the stacking mechanism looking from the right of Fig. 1, and showing truck units in position to receive lumber from the stacker, the truck units, forming the carrier, being shown empty.

Fig. 3 is an enlarged face view of the lumber stacking skid.

Fig. 4 is a transverse sectional view thereof.

Fig. 5 is a sectional view of a skeleton type showing the disposition of controlling cable means.

Fig. 6 is a view on an enlarged scale showing the position of the carrier stake guard with respect to the stacker, when the first tier of lumber is about to be loaded.

Fig. 7 is a sectional view on line 7—7 of Fig. 6, on an enlarged scale.

Fig. 8 is a skeleton developed view of certain shafting and gravity cable actuated means.

Fig. 9 is an end elevation of a portion of a loaded carrier showing the boards after the same have been kilned and illustrating how shrinkage will cause the boards to space apart from each, edge from edge, so as to expose both edges, both ends and both sides to the drying operation.

Like characters of reference designate similar parts throughout the different figures of the drawings.

Reference will first be made to a portion of the trackage mechanism shown in this case, and completely illustrated and claimed in my co-pending application filed Sept. 2, 1915, Ser. No. 48,662. Incoming transport tracks, one only being shown, are designated at 1, and are disposed at right angles to transfer trackage, the latter being composed of sections 2, 3 and 4. Section 4 of the transfer trackage extends abreast of outgoing transport tracks 5 and it will be noted that sections 2 and 4 of the transfer trackage is at a lower elevation than transport tracks 1 and 5. A transfer car 6, preferably provided with bearing wheels 7 for traversing three rail transfer trackage, as illustrated in Fig. 2, is provided with transport track sections

8 for registry with either of the transport tracks 1 or 5 to permit of the carrier being run off from either of the transport tracks onto or off from the transfer car 6.

I consider that I am the first to run a carrier along incoming transport tracks onto a transfer car, on the wheels of the carrier, to move the transfer car past, through, or under a lumber stacker during the loading operation, and thence to advance the transfer car to outgoing transport tracks and run the carrier off from the transfer car on its own wheels onto the outgoing transport tracks.

Section 3 of the transfer trackage is arranged to be tilted, as shown in Fig. 1, for a purpose which will hereinafter appear, and I will next describe this novel feature in detail.

Transfer trackage section 3 is mounted upon a rigid framework 9 which is transversely fulcrumed on a shaft or piping 10. Said fulcrumed shaft 10 is mounted in suitable bearings 11, on a sunken portion 12, of the mill floor, and the trackage frame 9 is supported upon blocks 13 which are mounted upon fulcrumed shaft 10. It will be noted by reference to Fig. 1 that fulcrum shaft 10 is disposed appreciably nearer the end 14, of the frame 9, than to the end 15. Transfer trackage section 2 terminates in a butt joint end 16 and transfer trackage section 4 terminates in chamfered ends 17. In the present construction, in order to tilt transfer section 3, I elevate end 15 and lower end 14 of the frame 9, and movement of frame 9 to a normal position will elevate end 14 and lower end 15 so that frame 9 will be horizontal, and its trackage 3 will be flush with sections 2 and 4.

I will next describe the novel means for tilting the track section 3.

An operating lever 18, is mounted upon a shaft 19 which is journaled to rotate about a fixed axis. The operating lever 18 is mounted between its ends on said shaft 19, and the remaining end 20, is connected at 21, with a link 22, the remaining end of said link being connected at 23 with a tilting lever 24. Tilting lever 24 is mounted upon a shaft 25 which is journaled in bearings to rotate about a fixed axis. Said lever 24 is mounted on shaft 25 nearer one end than the other, of said lever, and the shorter end 26 is provided with a roller 27 adapted to engage a track block 28, on the lower side of frame 9. Track block 28 has a track surface for engagement by roller 26 so that when lever 24 is swung into a substantially vertical position, lever 24 will elevate end 14 so that frame 9 will be in a horizontal position. The arrangement is such that when frame 9 is in a horizontal position, the centers of lever 24 will be in dead center relation so as to lock frame 9 in a horizontal position. In the position shown in Fig. 1, a block 29

limits tilting movement of frame 9 and also steadies frame 9 when in such tilted position. On shaft 9 is mounted one or more arms 30, each having rollers 31, adapted to ride upon the track 32 of a track block 33. Track block 33 is mounted upon the lower face of frame 9 and the arrangement is such that when lever 18 is moved into the position as shown in Fig. 1, to tilt frame 9, the centers of roller 31 and shaft 19 will be in dead center relation so that frame 9 will be supported on arm 30, in a tilted position, and will be steadied by one or more blocks 29, in such tilted position. It will be understood that frame 9 will be in a horizontal position when transfer car 6, with its carrier, is run off from section 2 onto to section 3, and that the tilting operation of frame 9 will occur when the lumber carrier is empty, thereby enabling one operator to tilt the frame. It will also be clear, that as lever 18 is moved to the right of Fig. 6, the resulting shifting movement of the frame 9 to a horizontal position will be under the weight of the lumber carrier and I may if desired provide a stop block 34 for limiting tilting movement of the frame 9 beyond a horizontal position.

A specific point of novelty resides in the fact that fulcrum shaft 10 is disposed in a certain relation with respect to the lumber stacker, hereinafter to be described, so that when the carrier is fully stacked it will have been so advanced with respect to the position shown in Fig. 1, that a portion of the load will be on one side of a vertical axis intersecting the fulcrum shaft 10 and a portion will be on the other side thereby substantially counter-balancing frame 9, under load, and thereby greatly facilitating the means with which frame 9 may be restored to a horizontal position.

I will next describe my improved stacker mechanism.

An elevated framework 35, supported at 36, and by inner and outer uprights 37, 38 and 39 and 40, provides a platform 41 for the operator. Assorter mechanism fragmentarily indicated at 42, delivers to skids 43, from which the lumber discharges to receiving skids 44, where it may be manipulated by the operator to be deposited in the stacker. Depending from the platform 1, and accessible therefrom, are a plurality of sticker pockets 45, one only being shown, said pockets being arranged to facilitate the disposition therein of stickers run back on the empty carrier on incoming tracks 1, as set forth in my hereinbefore identified lumber handling apparatus. The length of the pockets 45 is such that the upper ends of the stickers will be accessible to the operator on platform 41.

My improved stacker, proper, includes end and central vertically disposed skids

which are shown more clearly in Figs. 3 and 4. The end skid structures preferably comprise pairs of skids 46 and 47, the skids 46 being of slightly increased height with respect to the skids 47. The central skid structure comprises a central skid 48 which is preferably equal in height to skid 46. The receiving skids 44 terminate short of the stacker skids and are supported by uprights 49. The skid surface between upright skids and receiving skids 44 is continued by spanning bars 50, pivoted at 51, and movable into and out of holders 52, the latter being mounted upon skids 46 and 48. By means of this construction, the operator can pass between the receiving skids 44 and the stacker skids, when occasion may require as the bars 50 can be lifted upwardly on their hinges 51 to afford free passage for the operator. Skids 46 are chamfered off near their upper ends, as indicated at 53, the same being also true of skids 48. However, skids 47 do not extend to the same height as skids 46 and 48 and therefore they need not be chamfered off as the boards will have been guided in their true course by the time they reach skids 47. In order to take up wear, all of the skids are provided with facing or wearing strips 54, 55, 56, and 57 and 58. The wearing strips for the longer skids extend up to the tops thereof, as shown in Fig. 4, and may be secured to the backs of said skids so as to provide an all metal contact on which the boards may be slid into position. The pairs of end skids are spaced apart from each other, slightly, and extending longitudinally therebetween in facing relation, are guides 59, in which board lowering devices 60, are mounted, for vertical sliding movement therein. Said lowering devices may be provided with oppositely projecting pairs of shoes 61 and 62, projecting into said guides, and near the lower ends of said devices I provide each with a roller 63 which projects forwardly of the faces of the stacker skids so as to receive and support a board from the lower edge thereof. The uppermost position of said lowering device 60 is shown in Fig. 4, and the guides 59 are of sufficient length so that the lowering devices can descend sufficiently below the level of the lumber carrier so as to deposit the boards in supported relation on the latter. The function of the lowering devices is to receive the first board of a tier to be stacked, at a point nearer the upper portion of the stacker, and then descend gradually as the tier of lumber is built up, board by board, until a full tier has been stacked on the carrier.

Now a special feature of this invention consists in counter-weighting the lowering devices in such a manner that as the load thereon increases, as each board of the new tier is in position, thereby increasing the

load on the lowering devices, the counterweight of the lowering devices will increase in such a manner that the lumber will not descend by hard impact on the carrier. In this operation, edge portions of the lumber are often injured in such a manner as to cause relatively high grade of lumber to be graded low. Therefore the advantage will be appreciated, over the old method, of gradually lowering the lumber so that an entire tier will be stacked, the tier being built up as it is stacked, and being gradually and easily let down on the stacker skids until it is in a final position.

As illustrated, a chain or cable 64 is provided for each lowering device and is trained over an idler 65 and connected with the lowering device at 66. The remaining end of the chain or cable 64 is reeved about a drum 67, mounted upon a drum shaft 68. It will be understood that there will be a chain 64 and a drum 67 for each lowering device. The chains or cables 64 are reeved about drum 67 in a contra-clockwise direction, looking at Fig. 4. Thus the weight on the lowering devices will tend to untrain or unreeve the cable 64 and cause the shaft 68 to rotate in a clockwise direction, looking at Fig. 4. Now mounted on shaft 68 is a gravity cable or chain drum 69 about which a chain or cable 70 is trained in a clockwise direction. The chain or cable 70 is provided with a weight 71 which normally causes stress to be imparted to shaft 68 in a contra-clockwise direction, thereby tending to elevate the lowering devices 60 into the position shown in Fig. 4.

Because of the novel construction set forth, a very advantageous compensating action is obtained, which I will now describe in detail.

When the lowering devices are at their highest points the chains or cables 64 are reeved up to such a diameter that they will exert considerable leverage in rotating the shaft 68 in a clockwise direction. The first board of a tier to be stacked, which is loaded on the lowering devices 60, will exert a relatively light thrust but the leverage on shaft 68 will be considerable. Now when the first board is placed in position, with the lowering devices in the position shown in Fig. 4, the chains or cable 70 of the weight 71 will be wholly unreeved or unwound as shown in Fig. 4, and will therefore exert a relatively reduced leverage opposing rotation of shaft 68 in a clockwise direction. However, as successive boards are lowered upon the lowering devices 60 and the weight on said devices increases, then the leverage of cables or chains 64 will correspondingly decrease. Furthermore, as the chain or cable 70 is reeved on to the drum 69, in gradually increasing diameter, the opposing leverage of the weight 71 will increase as the weight

71 ascends. Therefore, as the load on the lowering devices 60 increases the opposing weight 71 will also increase and the stacked up tier of boards will descend gradually and gently into a final position upon the carrier. In practice, I find it advantageous to connect the cables or chains 64 to diametrically opposite points with respect to the point of connection of cable or chain 70. With this disposition, and if the lengths of the chains are correctly proportioned, the terminal end of chain 70 will be completely unwound and the chain will pendantly hang from the drum 69 at the time the unloaders reach the uppermost position. Thus the empty unloaders will not be abruptly arrested in their upper position but they will reach such position by a gentle arrestment resulting from the complete unwinding of the chain 70 causing the weight 71 to arrest further contra-clockwise rotation of shaft 68. Furthermore, the chains or cables 64 are so proportioned that when the lowering devices 60 reach their lowermost points of travel, then said chains will be completely paid out from their drums and will be suspended from their terminal connection therewith. Therefore the lowering devices 60 will not, and can not jam the lumber upon the carrier.

I will next describe my improved carrier, and also the means for controlling movement of the carrier while the same is being loaded.

As shown more particularly in Figs. 1 and 2, my improved carrier is composed of a plurality of truck units 72, mounted on wheels 73, each unit comprising two end frames on which a transversely disposed bolster 73' is mounted. The bolsters 73' are provided with suitable sockets for holding load stakes 74, at each end, there being stakes forwardly, and rearwardly, or on both sides of the load. The specific form of truck which may be highly advantageously used in this connection, is set forth in my application for improvement on unloading mechanism filed the 21st day of Sept., 1915. I also prefer to use the improved kiln take-up, for the stakes 74, as shown in the application of Irving and Tanner, filed January 19, 1915, Serial Number 3,073. The importance of a spring take-up for the stakes will be more fully appreciated after I describe how the tiers of lumber are stacked under pressure, and maintained under pressure, during the stacking operation. It will be clear that the advantages of this initial pressure during the loading operation, should be maintained subsequent to the loading operation, in order to hold the intermediate boards in their initial positions so that when they shrink, they will not fall down in superposed edge contact and prevent the edges from being exposed to the kilning operation.

After the transfer truck 6 has been disposed in registry with incoming transport tracks 1, and the carrier comprising truck units 72, in independent spaced relation, has been run onto the transfer car 6, then the transfer car 6 is advanced below the stacker, with the carrier, the latter moving underneath the stacker. After the right hand end of the carrier has advanced to the right of the stacker, as shown in Fig. 1, only sufficiently to expose the foremost sockets, then the stakes 74 are placed in the position in Fig. 1 in said sockets. A restraining cable 75, having a hook 76, is connected with said transfer truck 6. The cable 75 is trained about an idler sheave 77 and said cable 75 is thence reeved or wound about a drum 78, mounted upon shaft 79. There will be a cable 75 for connection with each end of the truck 6 and similar parts will be duplicated. The cables or chains 75 are wound about drums 78 in a clockwise direction, looking in the direction of Fig. 1.

I have found in practice, that it is desirable to support the load on the carrier, as well as the carrier, while the latter is being loaded. I prefer to support the load by direct engagement with the first stakes 74 inserted. I will now describe the stake supporting means which is intimately connected with the transfer car restraining means.

A stake supporting bar, for supporting the load, is indicated at 79' and the same extends across or abreast of the stacking mechanism as illustrated in Fig. 2. Said bar 79', which may be formed of channel iron, is supported at its ends on supporting arms 80 which are pivotally mounted at 81 on uprights 39 and 40. The stake supporting bar 79' is slidably mounted upon the supporting arms 80 and I preferably provide U-bolts 82 which straddle the arms 80, and to which are applied nuts 83, to loosely connect bar 79' with arms 80. The free ends of arms 80 are connected by cables 84 and 85 with the ends 86 and 87 of bell crank lifting levers. Said bell crank lifting levers are mounted upon a superstructure including a beam 88 which may be mounted upon uprights 39 and 40. Because of the relatively extensive span of the bar 79, I desirably support the same midway of its end, this support comprising a supporting arm 89, pivoted at 90, and the free end of which is connected with a lifting cable 91, with an end 92, of a bell crank lifting lever. Said bell crank levers are pivoted at 93, 94 and 95 and each of said bell crank levers has a controlling arm, designated respectively at 96, 97 and 98. Arms 97 and 98 are connected by cable 99, to operate in unison, and arm 97 is connected with arm 96 by cable 100. The left hand bell crank lever is the controlling bell crank lever and is provided

with an extension 101 connected by cable 102, having a hook 103, with an eye 104, which may be fixed to any stationary part, as indicated at 105. A suitable take-up 106 may be provided to provide the proper adjustment.

Hook 103 will be disposed in the position shown in Fig. 2, to hold the bar 79' in an elevated position before the car is disposed in place to be loaded. After the car and stakes are in place to be loaded, the pressure on the bar 79' will be sufficient to hold it in position.

The intermediate supporting arm 89 is slidably connected with the stake supporting bar 79' by a suitable loop 106'.

I will next describe the manner in which the stakes are operatively connected with the load supporting bar.

As shown in Fig. 7, the stake supporting bar 79 is provided with three pairs of open guides 107, one pair only being shown, for each of the stakes of the carrier occupying the forward position as shown in Fig. 1, at 74. The stakes 74 are preferably of I-beam construction and the flanges thereof are slidable into said open guides 107. When the empty carrier is advanced to be loaded, with the forward sockets to the right of Fig. 1, the stakes 74 are inserted in the sockets after the bar 79' has been lowered and the upper ends of the stakes have been inserted in 107. Even before pressure is applied, the parts will fit sufficiently tightly so that the bar 79' can not, because of the pivotal mounting of the supporting arms 80, drop down along the stakes 74, even though the guides 107 are open.

Having described the structure of the stake supporting bar, I will next describe the manner in which it is operatively connected with the transfer car so that gravity movement of the transfer car will exert stress upon the stake supporting bar in such a manner that the upper portion of the load of lumber will be supported in predetermined relation with respect to the position of the carrier for the lumber.

Tension cables or chains 108 are connected with bar 79', at points opposite the endmost loader sheaves and said chains or cables 108 are trained about guides 109, which are idlers, and thence downwardly where they are wound about drums 110 in a contra-clockwise direction, with reference to Fig. 5. Drums 110 are mounted on shaft 79 and because of the fact that the cables 108 and 75 are wound about their respective drums in opposite directions, it will be seen by reference to Fig. 5, that when hook 76 moves to the right of Fig. 5, under weight of the transfer car 6, that tension on cable 75 will turn shaft 79 in a contra-clockwise direction, with reference to Fig. 5, thereby paying out cables 108 to the same extent as

cable 75 is paid out. The weight of the transfer car 6, on the inclined section 3, together with the carrier and whatever load may be on the carrier, will be very considerable and therefore a considerable tension will be exerted on cables 75 immediately after they have been connected with the transfer car. Likewise, the weight of the load upon the stakes 74 will exert a considerable tension on cables 108 and therefore all of the stress exerted upon shaft 79 will be in a contra-clockwise direction.

I will next describe the controlling means for regulating rotation of shaft 79 under action of the weight of the transfer car and carrier.

A controlling shaft 111 is mounted in suitable bearings in uprights 39 and 112 and is provided with a sprocket 113. Over sprocket 113 and a sprocket 114 on shaft 79, is trained a sprocket chain 115. A ratchet wheel 116 is mounted on said shaft 111 and a pawl 117, pivoted at 118 on upright 39, is adapted for engagement with said ratchet wheel. A rod 119 is connected at 120, with said pawl 117, and extends downwardly to its connection at 121 with a lever 122. Lever 122 is pivotally mounted between its ends at 123, and to the other end of said lever is pivoted at 124, a tread rod 125, which projects up through the platform 41, so as to be accessible to the foot of the operator. By depressing rod 125, pawl 117 is released from ratchet wheel 116, and the transfer car will be free to move by gravity along inclined section 3. A controlling wheel 126 is mounted on shaft 111 and is provided with hand grips 127 whereby shaft 79 may either be actuated or controlled in its movement as desired, the pawl and ratchet serving as an automatic locking means. As each tier of lumber is inserted on the carrier, or rather stacked on the carrier, the carrier and the stake supporter are let out, by adjustment of the controlling wheel 126, to the desired extent so as to space the stacked lumber sufficiently away from the stacker to leave room for insertion of the next tier.

I will next describe the novel method and means for maintaining the loose bodies of which the load is composed, namely the boards and stickers, under pressure during the loading operation, and reference will also be made to the novel means for guarding the upper ends of the stickers and the stakes so that when the boards around the chamfered upper ends of the stacker skids, they will not hit the tops of the stickers, or the tops of the stakes because of the improved guard extensions which I have provided.

The skids 46, 47 and 48 are supported on supporting beams 128 and 129, secured to uprights 37 and 38, and I utilize one of said beams, namely 129, as a support for

pressure means for engaging the load of lumber as the same is being stacked to hold each tier in tight engagement with its next adjacent tier. It will be understood, that if each newly stacked tier is forced into and subsequently maintained in pressure engagement with the next preceding tier stack, then the oppositely acting spring controlled stakes 74 can consequently act to maintain the initial pressure. However, if intermediate tiers were stacked loose and not in tight lateral engagement with each other, then the spring controlled stakes 74 might not hold all of the tiers in tight abutting relation against their stickers.

In the form shown, I have provided lower sticker engaging springs 130, there being five in number for this particular stacker, three of said springs being mounted upon support 129 and the remaining two being mounted upon uprights 38 and 37. As all of said springs are the same in construction and operation, only one need be described in detail.

Each spring has an intermediate pivoted support 131 and the upper end of each spring is anchored at 132 so as to project the lower end of the spring outwardly as shown in Fig. 1. Furthermore, the springs are of heavy steel and they are tempered so as to take an outward position and maintain such position under very heavy resistance. The springs 130 are located at the point at which the stickers are disposed in the load and as the three intermediate springs 130 I dispose near the truck units, it will be seen that compression of the opposed stakes 74, under their springs 74', will act upon the interposed tiers to compress the same directly against their stickers. Furthermore, the intermediate stickers may rest upon the truck units or rather the bolsters 73 thereof.

At this point, I desire to emphasize the importance of a novel feature of this invention which provides for the placing of stickers near the ends of the load of lumber so that the boards will be prevented from edging inwardly from their ends beyond the points at which the endmost stickers are disposed. Furthermore, the endmost stickers may be disposed as near the ends of the boards as desired. Inasmuch as the endmost stickers would inevitably be beyond the lumber carrier, endwise, I have provided special supports, the main function of which is to limit downward projection of initially inserted stickers.

As illustrated, I dispose sticker supports 133 along side the outermost or end springs 130, and I provide the supports 133 with angle irons 134 onto which the endmost stickers are projected into position, the angle irons 134 limiting downward movement of the stickers by hand, so that the endmost

stickers will assume the same elevation in the load as the intermediate stickers which rest upon the bolsters 73.

Now it will be clear that whenever a sticker is inserted in position, it will be immediately engaged by its respective spring 130 with sufficient tension to not only hold the sticker against displacement but to also press the sticker and its next adjacent tier against the remainder of the load with sufficient pressure to maintain the load in compact condition. All of the foregoing refers to the lower ends of the stickers.

I will next describe tension means which is automatically placed upon the upper ends of the stickers.

Supporting beams for the sticker and stake guards and the upper sticker tension members are indicated at 135 and 136. On the left hand side faces of said beams 135 and 136, with respect to Fig. 1, are mounted tension guards and tension members 137, all of which are similar in construction and operation, there being one for each sticker corresponding to the number of springs 130. Each of the combined guard and tension bars 137 may if desired be hinged at 138, to the upper beam 136, and bolt 139 extending through beam 135 and engaging bars 137, with their heads 140, are held under tension by springs 141, so that the lower ends of bars 137 will normally take a position in spaced relation with respect to the front faces of the stacker skids. The lower ends of the bars 137 will also normally take a position to the right of Fig. 1, from the position which they are shown in said figure as in that view they are shown slightly sprung to the left by pressure against the sticker and load. Said bars 137 are preferably formed of angle iron and they extend downwardly a sufficient distance so as to extend about the stickers and form a continuous overlapping surface facing the tiers to be stacked so that when the boards round the upper ends of skids 46 they will first slide along the guards 137 but can not drag or hit on the top of the nearest sticker. This is clearly shown in Fig. 1, where the guard 137 extends about and slightly below the top of said sticker nearest the lumber which is being stacked. Now in addition to forming a guard, bar 137 normally engages the top of the sticker and forces the same to the right of Fig. 1, against the load, so as to hold the upper tier in pressure engagement in the same manner as the lower tiers are held. The tension of the bar 137 and the spring 130, will continue to be exerted upon the stickers as the car 6 is advanced for stacking of the next tier. Of course the next tier stacked will compress the springs 130, so that when the last tier is stacked the springs 130 will engage the lower board there and the bar 137 will engage the upper

end of the sticker. Then when the car is advanced, and new stickers are inserted, they will be engaged by the spring 130 and bar 137, in the manner shown in Fig. 1.

It will be noted, by reference to Fig. 6, that in stacking the first tier of lumber, the stakes 74 will be disposed abreast of, and in close relation with the skids 46. Now in order to prevent the boards from striking the tops of the stakes 74, when they round over the upper ends 53 of the skids 46, it is necessary to guard the tops of the stakes 74, but this guard for the stakes 74 will only come into play when the first tier is stacked. After the first tier is stacked, then the stakes 74 will be out of reach of the boards forming the subsequent tiers.

For each stake I provide a stake guard 142 which is also of angle iron, and which will be seen more particularly by reference to Fig. 7, and which is designed to overlap the front eye-flanges nearest the skids 46, at the tops of the stakes 74. The stake guards 142 extend upwardly abreast of the right hand faces of beams 135 and 136 and the upper end of each guard 142 is tensioned by a spring 143 which is interposed between the upper end of the guard 142 and a washer 144, on a bolt 145, which extends through beam 136. Now in order to insure engagement between the stakes 74 and their guards 142, which engagement will be of a relatively slight length, I preferably provide the stake supporting bar 79' with a guard abutment 146 which projects forwardly of the bar 79' so that it will engage the guard 142 and advance the same up to the position to which the stake 74 has been advanced toward the skid 46. Thus the guard 142 will prevent the boards from hitting the top of the stake 74 as the first tier is stacked. In Fig. 6, I have shown the arm 89, hinged at 90, to central guard 142 but it will be understood that the guards 142 for the end stakes, adjacent the skids 46, will be free at their lower ends. When the last tier has been loaded, the car 6 will have been advanced so that the stakes on the opposite side of the load, from the stake 74, in Fig. 1, can be inserted downwardly into their sockets at the left hand ends of the bolster 73, in advance of the beams 128 and 129. Of course sockets will be adjusted to permit of free entrance of these stakes and then subsequently the sockets will be released so as to cause the stake last inserted to take its position in tight engagement against the last tier of lumber, this operation being clear from the use of my improved take-up stakes in my hereinbefore identified application. Thus it will be seen that initial pressure against the tiers of lumber, as the tiers are stacked, tier by tier, will be maintained even up to the last tier and even up to the insertion of the last stakes. Therefore, the carrier will

go into the kiln with uniform pressure exerted upon all of the lumber throughout the cross section of the load. With this pressure on the lumber, effectively maintained, and effectively taken up as shrinkage begins and continues, the boards will be held in their initial positions so that after shrinkage there will be spaces between the previously abutting edges, as indicated at 147, in Fig. 9, so that drying action will not only take effect on the sides of each board, but also on both edges thereof, thereby greatly reducing the period heretofore necessary in properly kilning lumber. I consider that the foregoing feature is novel, both as an apparatus and as a method.

After the last stakes have been inserted and the loaded carrier is ready to be advanced, then, as hereinbefore described, it will be in such a forward position on the track section 3, with respect to the position shown in Fig. 1, as to dispose the load in practically counter-balanced relation on opposite sides of fulcrum shaft 10. Then lever 18 will be turned to the right of Fig. 1, thereby permitting the left hand end 15 to lower and the right hand end 14 of frame 9 to raise until the frame is in a horizontal position. Then the car 6 is released from cables or chains 75 and hook 103 will be brought down and engaged with eye 104 so as to elevate the stake engaging bar 79', from engagement with the stakes 74. Then the car 6 may be advanced onto trackage section 4 until rail sections 8 register with the outgoing transport rails 5, whereupon the carrier, comprising the truck units 72, may be rolled onto tracks 75 and toward the kiln.

It is believed that the advantages and utility of the apparatus and method invention hereinbefore described will be clearly understood, and while I have herein shown and described specific forms of my invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. In a lumber stacking mechanism, an edge stacker inclined to the vertical, a lumber carrier, trackage for said lumber car-

rier to permit movement of the latter beneath and gradually forwardly of the stacker to receive the lumber therefrom, means for tilting a portion of said trackage to incline the carrier for gravity movement during the stacking operation, means for controlling gravity movement of said carrier during the stacking operation, said track tilting means being shiftable to normal after said carrier is loaded to permit the latter to be advanced on said trackage, substantially as described.

2. In a lumber stacking mechanism, a lumber stacker, a lumber carrier, trackage supporting said carrier for movement into loading relation with respect to said stacker, a section of said trackage being tiltable about a tilting or fulcrum axis, means for tilting said section of trackage to cause gravity movement of the carrier during the stacking or loading operation, said stacker being in such relation with respect to said fulcrum axis as to dispose the carrier in substantially counter-balanced relation on the tiltable track section with respect to said fulcrum axis at the time that the carrier is finally loaded, substantially as described.

3. In a lumber loading mechanism, an edge stacker, a lumber carrier for receiving a load from said stacker, and superposed depending hinged spring members for exerting tension on the upper portion of the load to hold the latter in compact condition while the carrier is being loaded, substantially as described.

4. In a lumber loading mechanism, an edge stacker, a lumber carrier for receiving a load from said stacker, and superposed depending hinged spring guards for exerting tension on the upper portion of the load to hold the latter in compact condition while the carrier is being loaded, and for guarding the tops of carrier stickers during the loading process.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL R. TANNER.

Witnesses:

NELLIE HILLS,
C. H. FINN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."