

Mar. 6, 1923.

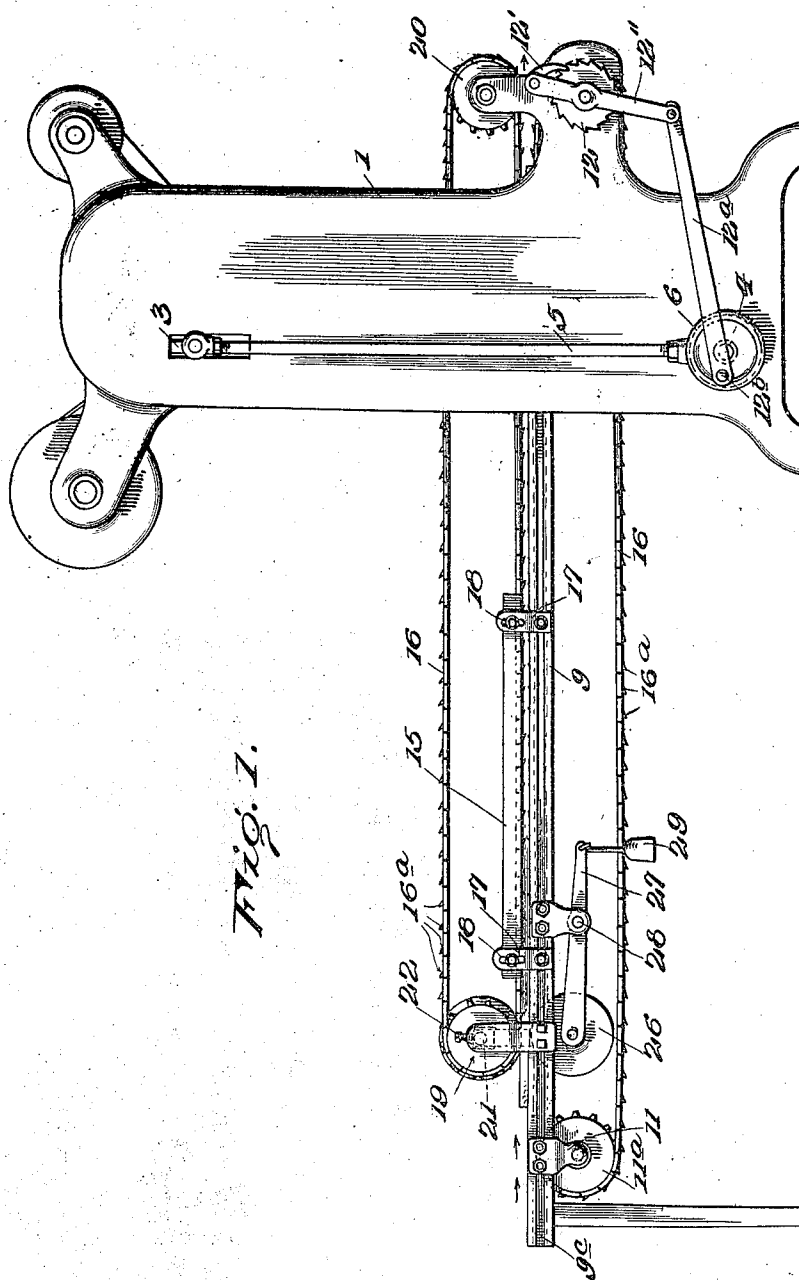
J. SHELLENBERGER.

1,447,490.

FEED MECHANISM FOR WIREBOUND BOX BLANK MACHINES AND THE LIKE.

ORIGINAL FILED OCT. 25, 1919.

3 SHEETS—SHEET 1.



Inventor.
John Shellenberger
by *Hubert Peak*
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Mar. 6, 1923.

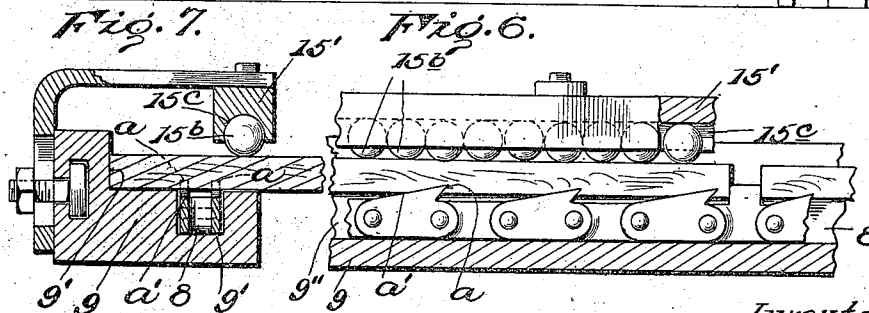
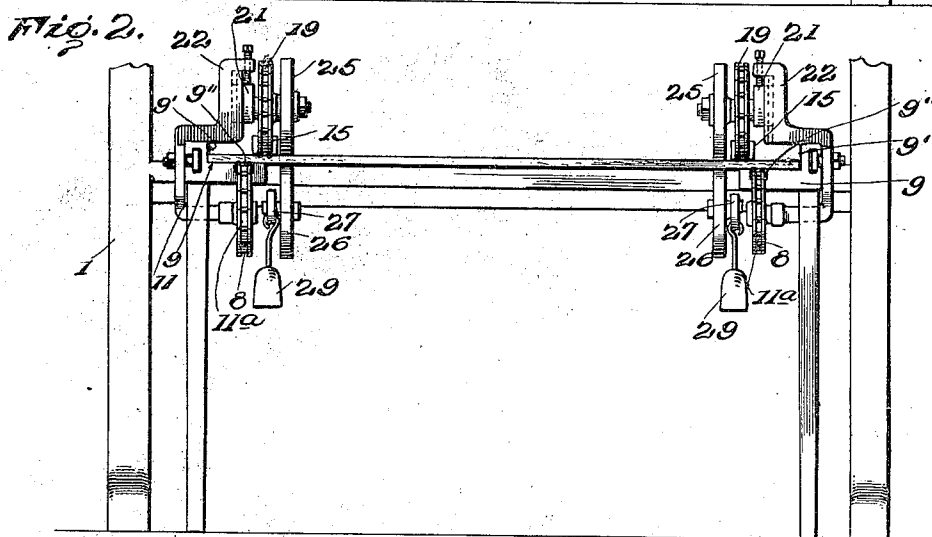
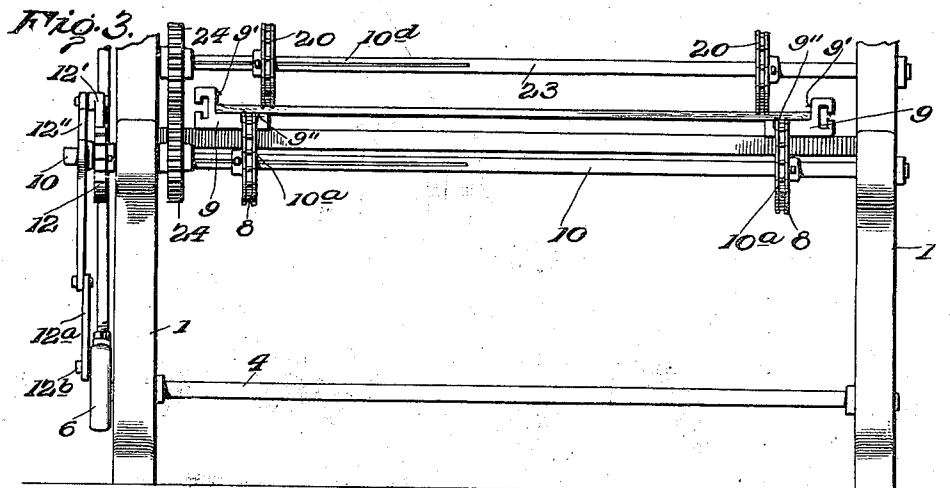
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3 SHEETS—SHEET 2.



Inventor.
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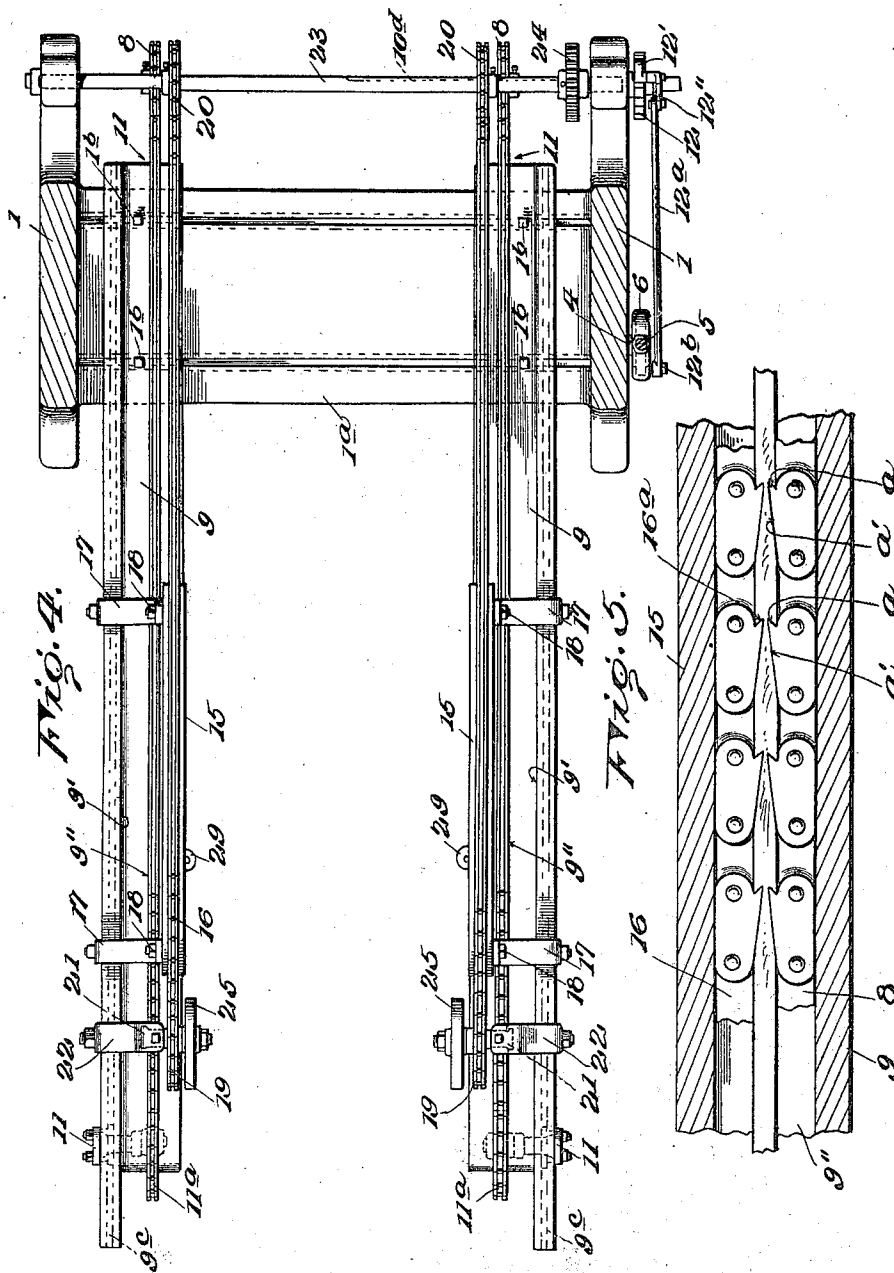
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ORIGINAL FILED OCT. 25, 1919.

3 SHEETS—SHEET 3.



Inventor.
 John Shellenberger.
 by *Kuhnt & Pick*
 his Atty.

UNITED STATES PATENT OFFICE.

JOHN SHELLENBERGER, OF ROME, GEORGIA, ASSIGNOR TO SEALED CASE COMPANY,
A CORPORATION OF NEW YORK.

FEED MECHANISM FOR WIREBOUND-BOX-BLANK MACHINES AND THE LIKE.

Application filed October 25, 1919, Serial No. 333,220. Renewed April 1, 1921. Serial No. 457,704.

To all whom it may concern:

Be it known that I, JOHN SHELLENBERGER, a citizen of the United States of America, and resident of Rome, Floyd County, State of Georgia, have invented certain new and useful Improvements in Feed Mechanisms for Wirebound-Box-Blank Machines and the like, of which the following is a specification.

This invention relates to certain improvements in feed mechanisms for wire bound box blank machines and the like; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following explanation of the accompanying drawings illustrating what I now believe to be the preferred mechanical expression or embodiment of the invention from among other forms, constructions and arrangements within the spirit and scope thereof.

Heretofore, difficulties have been encountered in the manufacture of wire bound box blanks by machinery, among other reasons because of the difficulty of keeping the longitudinal edges of the pieces of thin lumber or veneer in close contact, while passing through the stapling machine, as is necessary for the production of such blanks with the desired tight joints between the edges of the pieces of lumber. Often, the pieces of lumber vary in thickness, or in degree of hardness, and sometimes the pieces of lumber have become curved, cupped or otherwise distorted from true flat form by warping. The jerking action of the step by step movement of the feed chains commonly employed in wire bound box blank stapling machines, often tends to separate the pieces of lumber, particularly where the pieces vary in thickness, hardness or form.

It has heretofore been necessary for the machine operator to most closely watch the pieces of lumber while being carried forward by the feed chains, and to push forward pieces where separation occurs, to maintain the desired close contact between the lumber pieces. It is not always possible to thus properly position the pieces in the feed chains and it is almost impossible to secure operators who will give the desired constant care and attention necessary to the successful operation of the machines commonly in use, and also to secure operators who will properly place the lumber in the

machine and feed the same to the feed chains heretofore employed.

To reduce the aforementioned difficulties to the minimum, I have produced feed mechanism for such pieces of lumber or veneer, characterized by an initial or auxiliary friction feed designed to press each piece of lumber forward into close engagement with the preceding piece that has been delivered by such initial feed to a feed chain embodying teeth that take firm hold of the lumber pieces to positively carry them forward but also permit said initial feed to press said pieces forward into close edge contact with respect to said chains, and this without regard to variations in the thickness, hardness or shape of the lumber pieces, within reason.

An object of the invention is to provide means for advancing a succession of flat pieces of thin lumber or the like by positively biting into or taking hold of the same in such manner that each sheet is held against stopping or retrograde movement with respect to said means yet is free to be forced forward with respect to said means, in connection with mechanism for successively moving said pieces forward into said means with comparative rapidity for pressing the front edge of each piece into snug engagement with the rear edge of the preceding piece or into engagement with portions of said means employed to space sections of the blank to be formed.

A further object of the invention is to improve feed mechanisms that handle thin veneer or sheets of lumber such as employed in making wire bound box blanks, with the end in view of increasing the accuracy of such mechanisms and the ease with which the sheets can be delivered thereto.

With these and other objects in view, the invention consists in certain novel features in construction, and in combinations and arrangements as more fully and particularly set forth and specified hereinafter.

Referring to the accompanying drawings:—

Fig. 1, is a side elevation of a wire bound box blank machine embodying my invention, said machine being more or less diagrammatically and partially illustrated.

Fig. 2, is a detail end view of the receiving or inlet end of the feed mechanism.

Fig. 3, is a detail end view of the discharge end of the machine.

Fig. 4, diagrammatically illustrates a wire bound box blank machine in horizontal section, showing the feed mechanism in top plan.

Fig. 5, is a detail longitudinal vertical section.

Fig. 6, is a detail longitudinal vertical section illustrating a modified construction, and Fig. 7 is sectional view of said modified construction.

The drawings diagrammatically or partially illustrate a wire bound box blank or stapling machine embodying a frame 1 and stapling mechanisms periodically operated by reciprocating cross head 3. The cross head is reciprocated by drive shaft 4, through the medium of one or more reciprocating pitmen 5 and crank or eccentric connections 6.

In wire bound box blank machines feed mechanism is employed to advance the thin sheets of lumber and the binding wires resting thereon, step by step beneath the stapling mechanism so that said mechanism applies staples to straddle said wires and enter the lumber sheets while the feed is at rest between its feeding strokes. Endless chains have been employed to feed the lumber sheets through the stapling mechanism, and these chains have been operated step by step and timed with the movements of the stapling mechanism through the medium of ratchet mechanism actuated by the drive shaft 4. My present improvements relates to feeding mechanism for the lumber sheets and blanks, and any suitable means can be employed for actuating the same, although in this example I show conventional ratchet mechanism for this purpose. My improved feed mechanism comprises a chain feed made up of one or more endless link belts or chains embodying peculiar inclined or tapered work penetrating or biting teeth and means for backing the work to hold the same to said teeth.

In the example illustrated, I show two such endless link belts 8, arranged a distance apart in parallelism and moving as one. These belts are arranged longitudinally of the machine and their straight upper plies or lengths travel longitudinally of and are upheld and maintained in the desired horizontal plane by elongated horizontal supporting tracks, rails or bars 9 arranged longitudinally of the machine frame and supported thereby. The lumber sheets rest and slide forward on the top surfaces of these rails, and the outer edge portions of the tops of the rails are usually formed with longitudinal upstanding guide edges 9', to engage the end edges of the lumber sheets and maintain said sheets in alinement. These rails are also formed with longitudinal top grooves or guideways 9'' in which the top plies or lengths of the feed chain are con-

fined and on the flat floors of which the chains slide forward and by which the operative feeding portions of the chains are held in proper position and in the desired elevation with respect to the work and the top surfaces of the rails on which the work rests and slides.

These feed chains are carried by sprocket wheels 10^a on and driven by the drive shaft 10 and by alined idler sprocket wheels 11^a supported in any suitable manner, although I show the idlers 11^a supported by brackets 11, secured to and depending from the rails 9.

The drive shaft 10 is mounted in the machine frame and at one end projects beyond the same to receive the ratchet wheel 12 rotated step by step through the medium of pawl 12', moved back and forth on its operative and return strokes by pawl carrier 12''. The carrier 12'' is oscillated by pitman 12^a having eccentric or crank connection 12^b with main drive shaft 4. However, I do not wish to limit my invention to any particular actuating devices for the feed mechanism.

The feed chains 8 embody more or less closely arranged forwardly pointing elevated undercut blades or teeth *a*. Each blade has an elongated upwardly and forwardly inclined straight edge *a'* longitudinally of the chain and at its front end terminating at the sharp penetrating point *a* formed by undercutting the front end of the blade. Each blade can form or be formed by a link of the chain. The chain slideways 9'' are of such depth with respect to the vertical width of the chain that said teeth will project a short distance, say about one sixteenth of an inch more or less, above the horizontal plane of the surfaces of the rails 9 on which the blanks (work) slide. In other words, the feed chains are countersunk or depressed in the rails 9 except for said points. These points are so formed that the blanks or sheets of lumber can be forced forwardly with respect to the chain but will be held by the saw tooth points against relative rearward movement requiring the blanks to move forward with the chains, as will more fully appear hereinafter.

Various means can be provided for backing the lumber sheets and the feed chains to hold said sheets and saw teeth of the chains in operative engagement. I prefer to attain this end by holding the sheets down on the rails 9 and approximately pressing said sheets toward said chains. Various means and arrangements can be provided for thus holding the lumber sheets down on rails 9, although in the main views of the drawings, I show upper pressure bars or rails 15 arranged above and parallel with the rails 9, and upper endless link belts or chains 16, above and parallel with chains 8 and having their lower forwardly moving

lengths or plies held down to the lumber sheets by said upper rails 15. These upper chains 16 have long forwardly inclined projecting teeth 16^a similar to the teeth of chain 8, and the rails 15 are grooved at their under sides to receive the bottom forwardly movable lengths of chains 16 and permit the teeth 16^a to project about the same distances below the bottom surfaces of rails 15 as the teeth of chain 8 project upwardly from rails 9. The upper and lower rails 15, 9, are spaced a distance apart approximately equal to the thickness of the sheet lumber to be operated on so that the sheets slide forward approximately in engagement with the adjacent surfaces of the pairs of rails.

The upper rails 15 are supported in vertical adjustment so that the spacing between rails 9 and corresponding rails 15 can be varied according to the thickness of the sheet lumber to be handled. In the particular example illustrated, I show rails 15 carried by brackets 17 secured to the rails 9 by clamping bolts 18 passing through vertical slots in the brackets to permit said adjustment. However, I do not wish to limit myself to any particular structure for supporting and adjusting said upper or presser rails.

The upper feed chains 16 travel with and are driven from the actuating means of the lower feed chains. For instance, I show the upper chains mounted on idler sprocket wheels 19 at the lumber-sheet-receiving end of the machine and on driving sprockets 20 at the stapled-blank discharge end of the machine. The idlers 19 are carried by and mounted on boxes or blocks 21 mounted and vertically adjustable in upright brackets 22 clamped to the main rails 9, and adjustable longitudinally thereof. The sprockets 20 are mounted on and driven by a shaft 23 carried by the machine frame and operatively connected with and driven by shaft 10 through the medium of gearing 24. The gearing 24 and the various sprocket wheels are so arranged and of such relative diameters that the operative portions of the upper and lower chains 8, 16, travel at the same speed.

At the lumber sheet receiving end of the machine, I provide an initial or auxiliary lumber sheet or veneer feeding device for rapidly moving the sheets forward and delivering them to the somewhat slower moving feed chains. In the example illustrated, this initial feed is composed of upper and lower cooperating rotating rolls the peripheral speed of which exceeds the surface speed of the operative portions of the feed chains. The upper rolls 25, are positively driven and are fixed to and rotated by the sprocket wheels 19 which are driven by the chains 16. Each sprocket 19 has a feed roll arranged at the inner side thereof and alined

therewith and of slightly greater diameter than the sprocket wheel so that the circumferential surface thereof travels at a slightly greater speed than the feed chains. There is a cooperating lower roll 26 for each upper feed roll 25. Each lower roll is an idler and is yieldingly upheld with a constant tendency to move up into contact with its corresponding upper roll. These lower rolls can be pressed upwardly by any suitable means, although I show them freely rotatable on suitable alined axes carried by the free ends of vertically swingable levers 27, fulcrumed between their ends to brackets 28 secured to and depending from the rails 9 and having their opposite ends carrying weights 29, which can be increased or diminished to vary the upward pressure of the rolls 26 against their cooperating rolls or against the intervening lumber sheets. The pairs of rolls 25, 26 are arranged between the pairs of rails 9, 16, and somewhat in advance of the sprockets 11^a (the lower chains 8 in this example being of greater length than the upper chains 16) and of the extended rear ends 9^a of the lower rails 9.

The sheets to form the wire bound box blanks are placed on the extended rail ends and are pressed forward into the bite between each pair of feed rolls 25, 26. The lower rolls press the sheets upwardly into engagement with the driven upper rolls and the sheets are thereby quickly pressed forward on the main or lower feed link belts 8 and into the bite between belts 8 and 16. As the rollers feed the sheets slightly faster than the belts, each succeeding sheet is thereby held tightly against the rear edge of the sheet in advance for the provision of tight joints between the sheets of the blanks after stapling. The saw-like teeth of the feed chains permit the rollers to thus press the sheets rapidly forward between said chains as the sheets can slide forwardly over these teeth because of the inclined edges, while the points of the teeth prevent the chains from slipping forward past the sheets, and thus hold the sheets with their edges tightly abutting. The points of the teeth enter and bite into the lumber sheets and positively carry the sheets through the machine and yet readily release the same at the discharge end of the machine. The presser bars 15 hold the upper chains to the sheets and the sheets to the lower rail and the teeth of the lower chains, while the rails will flatten out warped and cupped lumber sheets and enable the chains to positively and accurately feed and hold such distorted sheets during the stapling operation.

The presser means to hold the lumber sheets to the main or bottom feed chains, need not embody upper feed chains, such as 16, and I do not wish to limit my invention to such chains. Where presser bars or rails

alone are employed, to hold the lumber sheets flattened out on the bottom rails in position to be operated on by the main feed chains, it is desirable to employ means to reduce to the minimum friction between the lumber sheets and presser bars or rails. For instance, where upper chains are not employed, the presser bars or rails 15' corresponding to presser rails 15 and mounted and supported in a similar manner, can be provided with means affording a rolling contact with the lumber sheets. To this end the longitudinal bottom portions of said rails are formed with undercut or dovetailed roller or ball grooves or channels 15^a closed at their ends and containing balls 15^b depending from the rails to contact the upper surfaces of the lumber sheets.

The guideway for the lumber sheets established by the rails 9, can be varied in width by lateral adjustment of one of the rails 9 toward and from the other rail 9 to receive lumber sheets of different widths. This is rendered possible because said rails carry the pressure rails and the various rolls and sprockets at the sheet receiving end of the machine. At the discharge end of the machine, the shafts 10, 23 are extended laterally and formed with longitudinal keyways 10^a and the sprockets 20, 10^a on the extended ends of said shafts are slidable longitudinally of said shafts and have keys slidable in said keyways.

In the specific example illustrated, the two rails 9, rest on and extend transversely across the bed 1^a extending horizontally between and joining the two frame uprights 1. The rails are clamped on this bed by bolts 1^b. The heads of these bolts are located in undercut grooves arranged longitudinally of the bed. By loosening the nuts on the bolts, the bolts are thereby loosened in the grooves and are then capable of sliding therein longitudinally thereof with the rails as said rails are shifted on the bed toward or from each other. For the purpose of varying the spacing of these rails, as hereinbefore described, I preferably shift but one rail, to wit: the rail cooperating with the feed chains on the sprockets 10^a, 20, that are longitudinally slidable on the shafts 10, 23.

I find that the initial rapid feed for delivering the pieces of lumber or boards to the relatively slow moving feed chain, is effective in pressing the boards together to bring their engaging edges into close contact for the production of blanks for comparatively tight boxes or containers, where the feed chain and cooperating means serve to thus hold the boards in close contact. I also find that the friction feed rolls are of peculiar advantage in this initial feed, as the upper rolls can slip on the surfaces of the boards when such boards are pressed forward into snug engagement with the pre-

ceding boards that are slowly traveling with the feed chain, while the lower rolls being idlers, yieldingly hold the boards up to the upper rolls without exerting forward driving action thereon.

It is evident that various changes, modifications and variations might be resorted to without departing from the spirit and scope of my invention and hence I do not wish to limit myself to the exact disclosures hereof.

What I claim is:—

1. Feed mechanism for sheet lumber and the like, comprising a rapid initial delivering device, in combination with an endless conveyer having longitudinal blades with longitudinally inclined edges terminating at their front ends in elevated forwardly facing biting points to permit the sheets to slip forward over said points under the forcing power of said delivering device, presser means to hold the sheets toward said conveyer, and means to support the conveyer in operative relation with respect to said presser means.

2. Feed mechanism for sheet lumber and the like, comprising a rapid initial feeder, in combination with spaced upper and lower longitudinal rails between which the sheets slide and by which they are maintained flat, and an endless sheet-advancing conveyer movable longitudinally of said rails and formed with forwardly inclined pointed sheet biting teeth, said feeder arranged to press the sheets rapidly forward along the receiving end of the slowly advancing conveyer, the sheets and teeth being maintained in operative relation by said rails to hold the sheets to the teeth and the teeth to the sheets.

3. Feed mechanism for sheet lumber and the like, comprising an initial feeder, in combination with a guideway along which the sheets slide, presser means for holding the sheets to and flattened out on said guideway as they are advanced along the same, and a conveyer for advancing the sheets along said guideway, said conveyer having a succession of longitudinally arranged forwardly projecting sheet biting teeth arranged to prevent forward slipping of the conveyer on the sheets and to permit forward slipping of the sheets on the conveyer under the pushing force of the initial feeder.

4. Feed mechanism for sheet lumber and the like, comprising a guideway along which the sheets slide, presser means for holding the sheets to and flattened out on said guideway as they are advanced along the same, and a conveyer for advancing the sheets along said guideway, said conveyer having a succession of longitudinally arranged projecting sheet biting teeth, each tooth having its edge toward the sheets inclined longitudinally and at its front end

terminating in an elevated forwardly facing point to positively take hold of and advance the sheet and yet permit forward movement of the sheet with respect to the conveyer, in combination with means for thus pressing each sheet rapidly forward along the receiving end of the conveyer.

5. Feed mechanism for advancing lumber sheets, comprising longitudinal guide rails for the sheets, a longitudinal conveyer for positively advancing the sheets along said rails and maintaining the relative positions thereof in combination with friction feed rolls provided with supporting brackets carried by said rails, said rolls rapidly advancing the sheets on said rails and on the receiving end of the conveyer to establish the sheet positioning, said rolls including a positively driven roll and a yieldingly held opposing idler roll and means for positively driving said conveyer.

6. Feed mechanism for advancing lumber sheets, comprising a guideway along which the sheets are advanced and a positively driven longitudinal conveyer for positively advancing the sheets along said guideway and for maintaining the established positioning of the sheets, in combination with friction feed rolls at the receiving end of the guideway and constructed and arranged to successively advance the sheets onto said way and along the receiving end of said conveyer to establish the positioning of the sheets, said rolls embodying a feed roll driven from said conveyer and arranged to one side of the receiving end thereof and a cooperating friction roll.

7. Feed mechanism for sheet lumber and the like, comprising parallel rails forming a guideway for sheets, said rails having depressed longitudinal channels, endless link belt sheet feed chains set down in and traveling forward in said channels and having forwardly inclined sheet biting teeth projecting above the channels to positively take hold of the sheets and slide them forwardly along said rails, and normally-fixed means above the rails to hold the sheets down and flattened on the rails and to said teeth in combination with a relatively rapid initial friction feed for forcing said sheets forward on and with respect to said chains, substantially as described.

8. Feed mechanism for sheet lumber and the like, comprising a guideway along which the sheets are advanced embodying means to hold the sheets down to and flattened out on the guideway, an endless sheet conveyer traveling forwardly longitudinally of the guideway and means to positively take hold of and advance the sheets and yet permit forward movement of the sheets with respect to the conveyer, and means for pressing the sheets forwardly in said guideway and onto said conveyer at a relatively rapid rate of

speed to press the advancing edge of the incoming sheet tightly against the rear edge of the preceding sheet.

9. Feed mechanism for sheet lumber and the like, comprising a guideway along which the sheets slide, presser means for holding the sheets to and flattened out on said guideway as they are advanced along the same, a conveyer for advancing the sheets along said guideway, said conveyer having means to prevent the conveyer slipping forwardly on the sheets and to permit forward movement of the sheets on the conveyer, and relatively rapidly moving means for delivering sheets to the receiving end of said guideway and pressing the same forward longitudinally of said conveyer to snugly press the sheet being delivered against the sheet in advance.

10. Feed mechanism for sheet lumber and the like, comprising a guideway for said sheets embodying longitudinally channeled rails, endless link belts movable forwardly in said channels and having projecting teeth for biting into and positively advancing the sheets, said teeth being forwardly inclined to force the sheets forward with the chains and permit the sheets to be forced forward over the teeth, and feed rolls for rapidly delivering sheets to said guideway and forcing the same forward past said teeth and into tight edge engagement.

11. Feed mechanism for sheet lumber and the like, comprising upper positively driven friction feed rolls, cooperating lower idler rolls yieldingly upheld toward the upper rolls, a guideway in which sheets are rapidly pressed forward by said rolls, and a sheet conveyer to receive the sheets from said rolls and having teeth for biting into said sheets and positively moving them forward in said guideway at a relatively slow speed to permit the rolls to press the sheets together on the conveyer.

12. Feed mechanism for sheet lumber and the like, comprising upper and lower sheet advancing endless link belts having forwardly inclined teeth, means positively driving said belts in unison, and longitudinally channeled upper and lower rails in which said belts longitudinally travel and by which said belts are held to the sheets, said rails forming a guideway for the sheets.

13. Feed mechanism for sheet lumber and the like, comprising longitudinal rails on which the sheets slide forward, friction feed rolls carried thereby, upper rails for holding the sheets to the lower rails, means whereby the upper rails are adjustably supported from the lower rails to receive sheets of different thickness, and endless traveling sheet advancing link belts traveling longitudinally of said lower rails and arranged to receive sheets from said rolls, said belts having driving means independent of said sheets.

14. Feed mechanism for sheet lumber and the like, comprising longitudinal rails on which the sheets slide forward, rapidly rotating feed rolls carried thereby, upper rails for holding the sheets to the lower rails, means whereby the upper rails are supported from the lower rails, endless traveling sheet advancing link belts slowly traveling longitudinally of said lower rails and arranged to receive sheets from said rolls, and means whereby relative lateral adjustment can be effected between each pair of upper and lower rails and the parts carried thereby to receive sheets of different widths.
15. 15. Feed mechanism for advancing lumber sheets to stapling mechanism in a wire bound box blank machine, comprising longitudinal rails forming guideways on which the sheets slide forward, endless belt sheet conveyer means for positively advancing the sheets along said rails, upper rails carried by the lower rails for flattening out the sheets and holding them down on the lower rails and conveyer means, said upper rails being vertically adjustable with respect to the lower rails to accommodate sheets of different thickness, and means normally maintaining said lower rails in fixed position and relation and whereby the distance between said pairs of upper and lower rails can be varied to receive sheets of different widths.
16. Feed mechanism for advancing lumber sheets to stapling mechanism in a wire bound box blank machine, comprising a fixed bed plate, longitudinal rails extending across and resting thereon and forming guideways on which the sheets slide forward, sheet conveyer means for positively advancing the sheets along said rails, upper rails carried by the lower rails for flattening out the sheets and holding them down on the lower rails and conveyer means, said upper rails being vertically adjustable with respect to the lower rails to accommodate sheets of different thickness, and means normally maintaining said lower rails in fixed position and relation and whereby the distance between said pairs of upper and lower rails can be varied to receive sheets of different widths.
17. Feed mechanism for advancing lumber sheets to stapling mechanism in a wire bound box blank machine, comprising means constructed and arranged to flatten out and advance sheets of a blank in close succession, said means embodying a conveyer formed to prevent slip of the conveyer on the sheets and to permit forward slip of the sheets with respect to the conveyer to close up spaces between the sheets while being advanced by the conveyer, in combination with an initial friction feeder for successively advancing the sheets into said means at a speed greater than that of the conveyer and for causing said forward slip of the sheets in the conveyer, substantially as described.
18. Feed mechanism for advancing lumber sheets, comprising a relatively slow conveyer for positively advancing said sheets, in combination with a relatively fast friction feeder for successively delivering the sheets to and forcing them rapidly forward on the receiving end of said conveyer to force the sheets into the desired close relation on the conveyer, said conveyer constructed and arranged to maintain the relative positioning of the sheets established by said feeder.
19. Feed mechanism for advancing lumber sheets, comprising means embodying a conveyer for flattening out the sheets and positively advancing the same while maintaining the relative relation of the sheets, in combination with an initial feeder for successively forcing the sheets into said means and for establishing in said means the relative relation of said sheets, said feeder embodying idler friction rolls yieldingly held against the sheets and opposing positively rotated friction feed rolls.
20. Feed mechanism for advancing lumber sheets, comprising means for positively advancing the sheets in succession while maintaining the same flattened out, said means constructed and arranged to maintain the relative positions of the sheets established at the sheet receiving end of said means, in combination with a relatively rapid initial feeder for successively delivering the sheets directly to the sheet receiving end of said means and for pressing the sheets forward therein to establish said positioning of the sheets.
21. A machine for use in making wire-bound boxes comprising, in combination, means for applying binding wire to box parts; means for positively advancing sheets of side material; and a relatively fast friction feeder for successively delivering said sheets to said positive advancing means and for forcing them into desired close relation, said positive feeding means being constructed and arranged to maintain the relative positioning of the sheets established by said friction feeder.
22. A machine for use in making wire bound boxes comprising, in combination, means for applying binding wire to box parts; means for positively advancing sheets of side material; and a friction feeder for successively delivering said sheets to said positive advancing means and for positioning the same thereon, said positive feeding means being constructed and arranged to maintain the relative positioning of the sheets established by said friction feeder; said machine being adapted to operate without interruption on materials for a plurality of boxes.
23. A machine for use in making wire-bound boxes having a plurality of sheets of side material, comprising, in combination,

means for applying binding wire to the sheets; means for positively advancing the sheets; and a friction feeder for successively delivering the sheets to said positive advancing means and for positioning the same thereon, said positive feeding means being constructed and arranged to maintain the relative positioning of the sheets established by said friction feeder.

10 24. A machine for use in making wire-bound boxes having a plurality of sheets of side material, comprising, in combination, means for applying binding wire to box parts; positive work-forwarding means constructed and arranged to permit the sheets of side material to be advanced thereon and to prevent said sheets from slipping backward thereon; and a friction feeder for de-

livering said sheets to said positive work-forwarding means and positioning the same thereon. 20

25. A machine for use in making wire-bound boxes having a plurality of sheets of side material comprising, in combination, means for applying binding wire to box parts; positive work-forwarding means for the sheets constructed and arranged to permit the sheets to be advanced thereon in the direction of travel of the work-forwarding means and preventing movement of the sheets in the opposite direction; and a frictional feeding mechanism for advancing the sheets to desired position on the work-forwarding means. 30

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