June 3, 1952 D. G. KINGSLEY ET AL 2,599,460

CLEAT FEEDING MECHANISM

Filed Jan. 14, 1949 3 Sheets-Sheet 1

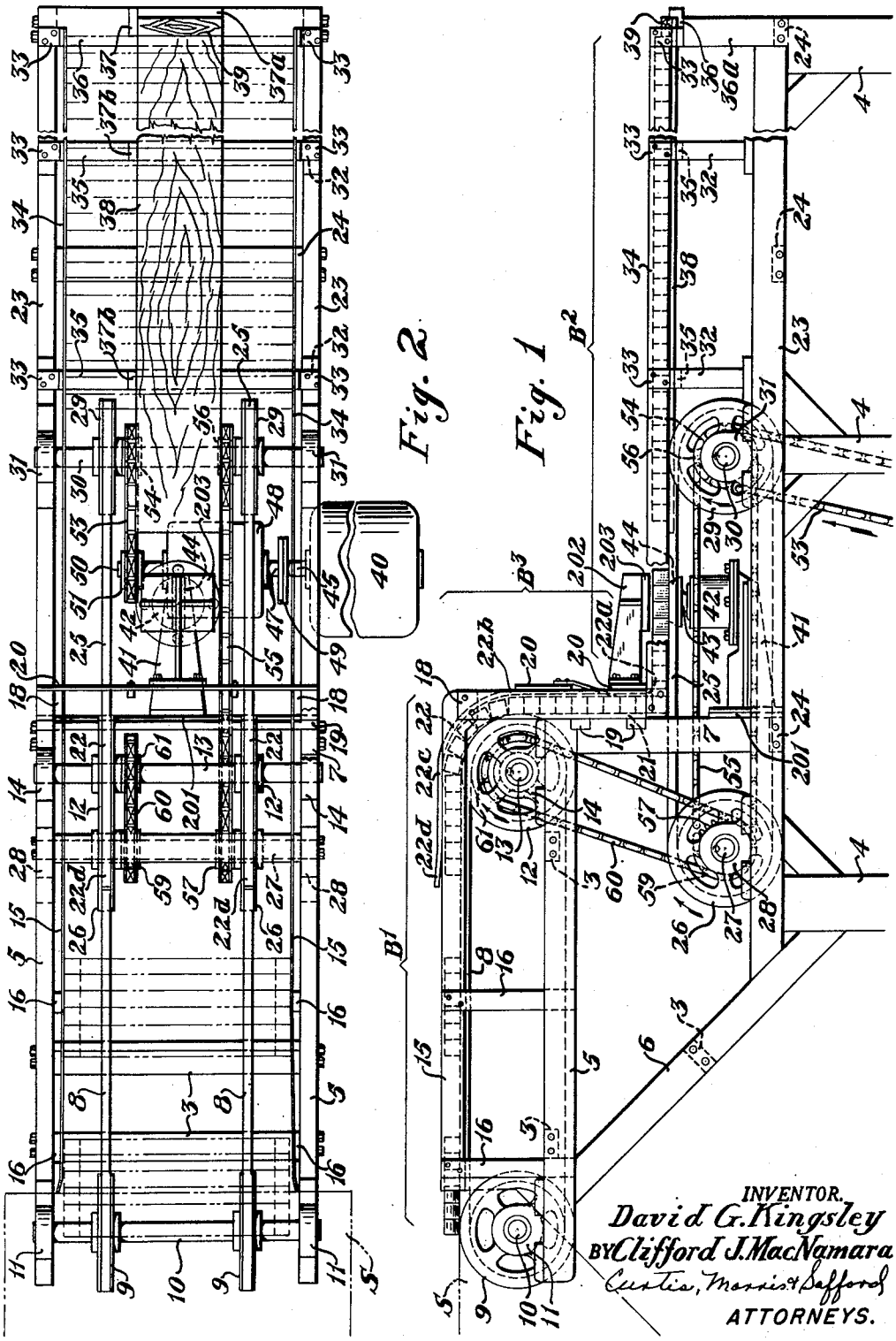


Fig. 2

Fig. 1

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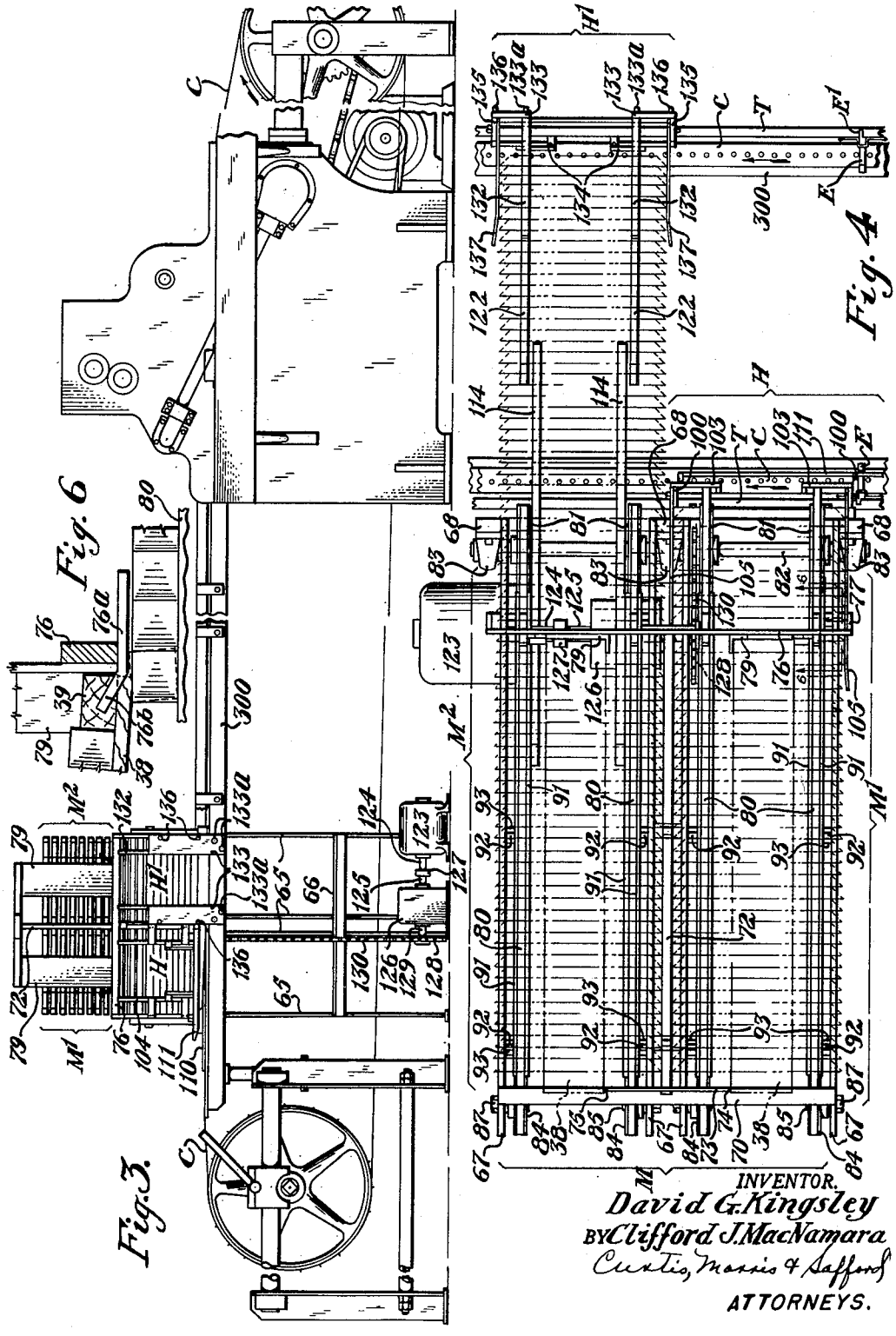


Fig. 3.

Fig. 4

Fig. 6

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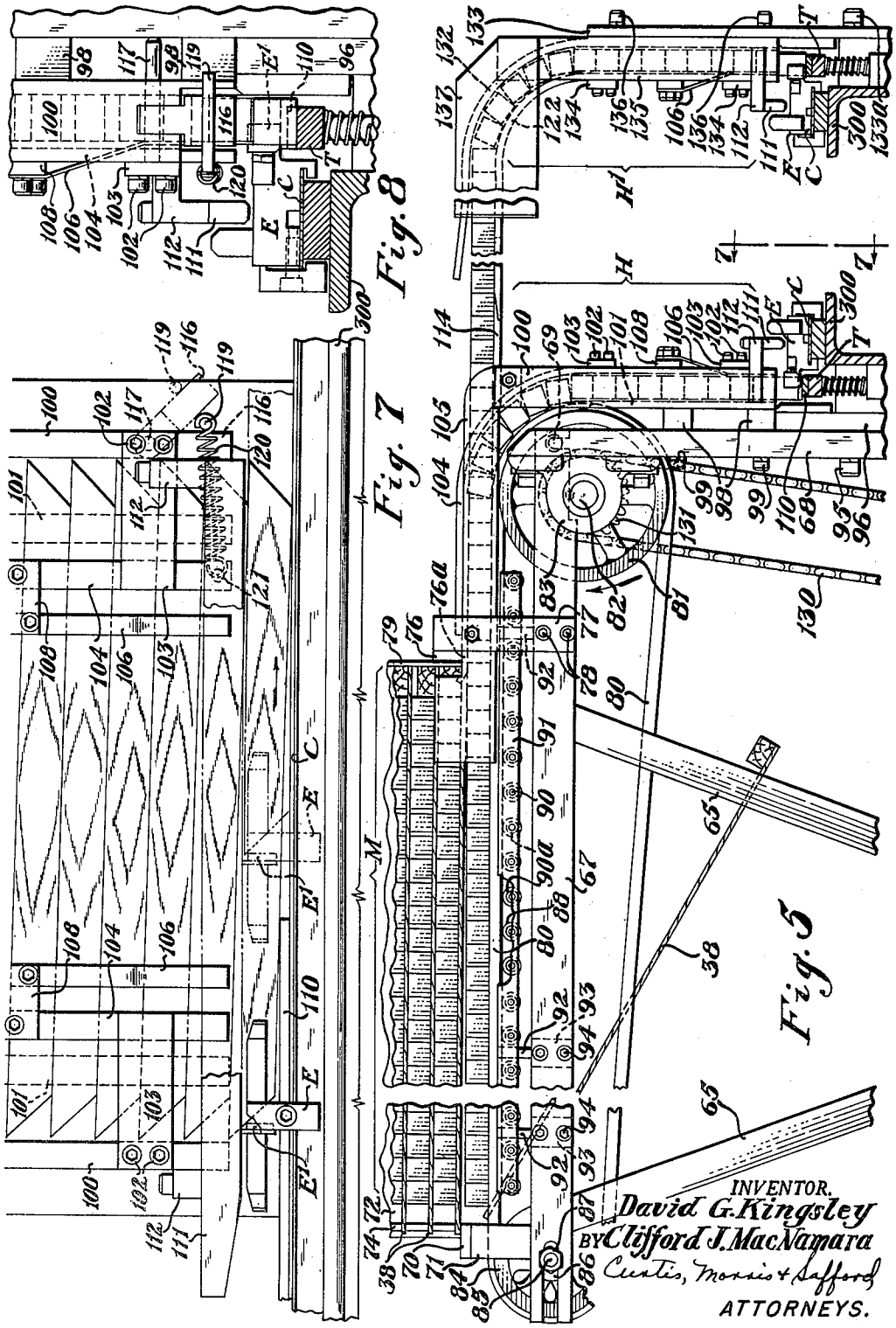


Fig. 8

Fig. 7

Fig. 5

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UNITED STATES PATENT OFFICE

2,599,460

CLEAT FEEDING MECHANISM

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Application January 14, 1949, Serial No. 70,868

5 Claims. (Cl. 1—8.2)

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The present invention relates to apparatus for feeding cleats to box-making machines for making boxes by stapling and/or wiring box parts together. More particularly the invention relates to apparatus for taking prearranged cleats from a mitering sawmill, stacking them, and delivering them one at a time with their mitered ends properly arranged to conveying mechanism of the box-making machine.

A box-making machine of the type with which the present invention is particularly useful, is shown in Rosenmund U. S. Patent No. 2,304,510, issued December 8, 1942. Such a machine staples cleats to side material, and simultaneously staples binding wire to the box parts. Conveying mechanism including a track for the cleats, and conveyor bands with spacer elements move the box parts to and through the stapling part of the machine. The cleats must be properly positioned with reference to the side material for the stapling operation. That is, the cleat ends which are usually mitered must uniformly face up or down as desired, and must lie properly between the spacing elements carried by the conveyor.

The present practice of handling cleats to obtain the desired prearrangement, is to stack the cleats on cleat supply trucks as the cleats are delivered from the sawmill but without regard to the arrangement of the mitered ends. The cleat supply trucks are then moved to a position adjacent the input end of the box-making machine where an operator manually places the cleats on the tracks between the constantly moving spacing elements.

This manual operation requires considerable experience, skill and dexterity on the part of the cleat layer, to insure the proper disposition of the cleats between the spacing elements. The operation has become increasingly difficult because of the high speed at which the conveyors move. Each time the cleat layer misplaces a cleat the machine has to be stopped, or if the cleat goes through the machine misplaced, the box or box part has to be discarded as waste. The problem is in fact so acute that it is now customary to use two cleat layers and a cleat stacker for each machine, and if the speed were still further increased additional cleat layers would be necessary, resulting in lower production efficiency and increased cost of the boxes.

It is an object of the invention to provide cleat feeding apparatus that will reliably feed cleats to the box-making machine at whatever rate is called upon by the speed of operation of the machine. Another object is to utilize the prearranged condition of the cleats as they are delivered from the mitering sawmill to insure the desired arrangement of the mitered ends of the cleats in the box-making machine.

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Another object is to provide apparatus for feeding cleats to a box-making machine which apparatus requires a minimum of attention and which is of simple construction and flexible in operation, so that a single mitering sawmill may be effectively used to supply cleats to several box-making machines. Another object is to provide stacking apparatus that provides for convenient storage of cleats in a prearranged condition, for subsequent use on different box-making machines.

To this end the present invention includes a cleat tray loading and stacking device, located at the output of a mitering sawmill for automatically loading the cleats in prearranged condition on easily handled trays or racks. In addition, a cleat dispersing device is located at the box-making machine for taking the prearranged cleats from the racks and stacking them above the tracks of the box-making machine so that the cleat spacing and moving elements remove successively cleats from the bottom of the stack.

Other objects will be in part obvious and in part pointed out by reference to the drawings in which similar reference numerals refer to similar parts throughout.

In the drawings:

Figure 1 is a side elevation of cleat receiving and tray mechanism for receiving cleats from a mitering sawmill and for loading the cleats on cleat trays. The mitering saw table is indicated by broken lines;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a longitudinal view of the right-hand side of a box-making machine showing an automatic cleat dispensing device embodying the invention attached to the opposite or left-hand side of the machine adjacent the input end of the machine;

Figure 4 is a top plan view, on a larger scale, of the cleat dispensing device of Figure 3, showing cleats, indicated by broken lines, being conveyed to box-parts-conveying elements of the left and right hand sides of the box-making machine;

Figure 5 is an enlarged side elevation of the cleat dispenser device viewed from the lower side of Figure 4, showing loaded cleat trays stored in a magazine and showing also how cleat-conveyors remove the cleats from the magazine and

stack them in a hopper above tracks on the left and right hand sides of the box-making machine;

Figure 6 is an enlarged fragmentary sectional view taken generally along the line 6—6 of Figure 4.

Figure 7 is an enlarged fragmentary view, with some parts omitted for clearness, of the left hopper as viewed from the line 7—7 of Figure 5, showing a cleat, indicated by full lines, resting in a tilted position upon a two-level support prior to being moved by a cleat spacing and moving element. This figure also shows, by broken lines, the cleat moved to its normal horizontal position; and

Figure 8 is a fragmentary end view of the left hopper taken from the right-hand side of Figure 7, showing a safety gate to permit two cleats to pass from the hopper at one time in the event of jamming.

Referring to Figures 1 and 2, the cleat tray loading mechanism comprises three sections, an upper bed generally indicated at B', a lower bed, generally indicated at B^2, and an intermediate cleat turning section, generally indicated at B^3, which connects the delivery end of the lower bed. The upper bed projects beneath but lies close to the upper surface of the delivery table of a mitering sawmill indicated by broken lines S in Figures 1 and 2, and upper cleat conveying surfaces of the upper bed coincide with and are at the same level as the upper surface of the table.

As shown in Figures 1 and 2, the upper bed of the cleat tray loading device is of open construction. It comprises fabricated side framework 5 secured by horizontal cross ties 3 and supported by leg members 4. Its receiving end is supported by diagonal brace members 6 (Figure 1) permanently fastened to legs 4 and to the outer end of framework 5. The other end of side framework 5 is supported by and secured to the top of upright members 7 extending upwardly from and secured to side framework 23 of lower bed B^2.

The upper bed B' supports between side framework 5 endless conveyor belts 8, which are of the well-known V-belt construction. Belts 8 pass over rearward idler pulleys 9 and over drive pulleys 12, respectively supported on stationary shaft 10 and rotating shaft 13 respectively mounted in suitable supports 11 and bearings 14 secured to side framework 5. The upper surfaces of the two belts 8 lie in the same plane as that of the mitering saw table S, so that as cleats are pushed forwardly from mitering table S they are picked up and carried by belts 8 without turning or otherwise misplacing the cleats.

To assure lateral alignment of the cleats while being carried forwardly by belts 8, suitable side guides 15 are located adjacent belts 8 and are fastened to the inside of upright members 16 extending upwardly from side framework 5. The guides 15 diverge at their receiving end and act to guide oncoming cleats into proper position between the guides 15. The delivery ends of guides 15 are aligned with and secured to parts of the cleat turning section B^3.

Belts 8 are driven as follows: pulleys 12 are keyed to shaft 13, which is suitably driven by a sprocket 61 keyed to the shaft, and by a chain 60 running over the sprocket. Chain 60 is driven by a sprocket 59 keyed to a shaft 27, suitably mounted in bearings 28 on side framework 23 of the lower bed. Shaft 27 itself is driven by a sprocket 57 keyed to the shaft 27, and by a chain 55 which passes over the sprocket and over a drive sprocket 56 keyed to a shaft 30 mounted in suitable bearings 31 also on framework 23. The shaft 30 in turn is driven by a sprocket 54 keyed to the shaft, a chain 53 and a sprocket 51, keyed to a shaft 50 extending from a speed reducer 48.

The speed reducer is driven through shafts 47 and 45 and coupling 49 by a suitable motor 40. With the foregoing construction belts 8 are continuously driven at a constant speed so long as the loader is in operation.

Cleats are received from the mitering saw table S bottom side up, and are continuously carried forward by the conveyor belts in this same arrangement, i. e., without turning the cleats endwise or axially. Thus, all the cleats are delivered by the upper bed to cleat turning section B^3 with their then sloping ends facing upwardly.

Referring now to the cleat turning section, belts 8 carry the cleats beneath the upper sections of a pair of outer cleat guides 22. These cleat guides extend horizontally from their ends 22*d*, around pulleys 12, and vertically downward, and terminate at 22*a*. They are supported by a flat wide cross brace 29 supported by two oppositely disposed narrow upstanding side members 18, spaced to permit the cleats to pass freely between them, but to keep the cleats properly laterally aligned.

Side members 18 are secured to and supported by horizontal bars 19 set into uprights 7.

Inner cleat guides 21 face the outer cleat guides and are secured to horizontal bars 19. Cleat guides 21 extend from a low point vertically upwardly to belts 8 and terminate at the belts to provide continuous guiding surfaces therewith. Cleat guides 22 and 21 extend upwardly, parallel to each other, and are spaced apart to provide a passage to receive cleats from belts 8, but to prevent axial turning of the cleats held between the guides.

Cleat guides 22 extend upwardly beyond guides 21 from point 22*b*, and from point 22*b* to point 22*c* the cleat guides 22 bend about pulleys 12 and are spaced from belts 8 to provide a curved passage therewith. This passage conducts the cleats delivered by belts 8, prevents indiscriminate turning of the cleats in the passage, and imparts to each cleat a quarter turn.

From point 22*c* to ends 22*d* the cleat guides extend generally parallel to the top surface of the belts, but slightly upwardly to prevent warped cleats from catching on the ends of the guides 22.

The cleat guides of cleat turner B^3 open downwardly onto the lower bed B^2, and onto a pair of V-belts 25 which remove the cleats one at a time from the stack of cleats in the guides and carry the cleats forwardly to a stacking tray or rack 38 (Figure 1).

To this end cleat guides 22 stop at point 22*a* sufficiently above belts 25 to permit the bottom cleat that is resting on belts 25 to be moved forwardly from under the stack, but to prevent the cleat next above from being dragged forwardly with the bottom cleat. The spacing between guides 21 and 22 prevents the cleat above the bottom cleat from turning axially as the latter cleat is carried forwardly by belts 25.

The speed of belts 8 of upper bed B^1 is such as to take care of the output of the mitering saw. Belts 25, however, travel at a speed slightly greater than that of belts 8 to prevent cleats backing up. Belts 25 are positioned and driven as follows. They pass about forward drive pulleys 29 keyed to the drive shaft 30, and about rearward idler pulleys 26 on shaft 27. These pulleys are of the same diameter as the pulleys

driving belts 8, but sprocket 61 driving shaft 13 which drives belts 8 is slightly larger than sprockets 59 and 57, with the result that belts 8 travel at a speed slower than belts 25. Both sets of belts are maintained taut to insure the proper position of the cleats.

The general construction of lower bed B^2 is similar to that of the upper bed. The side framework members 23 are spaced apart and secured by cross ties 24. Side guides 34 similar to guides 15 are supported from angle brackets 33 at the top of short upright members 32 secured to members 23. The rearward ends of longitudinal guides 34 are fastened to the outer surfaces of the side guides 18 of the cleat turner. Thus continuous side walls insure lateral alignment of the cleats.

It is noted that the lower bed extends appreciably beyond the point where belts 25 stop, and provides support for movable tray 38 which is loaded with cleats by the forward driving motion of belts 25. The tray, as shown in Figures 1 and 2, comprises a relatively thin board having at its forward end a stop 39. The forward end is supported on a cross member 35 extending between end uprights 36*a*. Tray 38 is positioned laterally by a side guide 37 mounted on cross member 36, and lengthwise by a stop 37*a* also mounted on cross member 35. Cross members 35, secured to brackets 33, support middle and rearward portions of tray 38, and hold the upper surface of the tray 38 in the same plane as or just slightly below the top surfaces of belts 25 so that as the belts carry the cleats forwardly, the cleats move from belts 25 and onto the tray, and are caused to slide forwardly therealong under the pressure of oncoming cleats on belts 25. Stops 37*b*, carried by cross members 35, provide lateral alignment of the tray so that its receiving end is equidistant between belts 25.

Thus, lower bed B^2 continually slides each lowermost cleat from under the stack of cleats held between guides 21, and the following cleats push each other forwardly until the leading cleat reaches and is stopped by stop 39 on tray 38.

When the tray 38 is nearly filled, further feeding of cleats from the stack is stopped so that the tray 38 may be lifted from its supports, and an empty tray replaced. To this end a bracket 202 rigidly mounted on flat cross member 20 is provided with a downwardly facing clamping plate 203 positioned just above the level of the cleats on belts 25, rearward of tray 38 and between belts 25. Vertically aligned with and below bracket 202 is another bracket 41 secured to a cross member 201 supported by posts 7. Bracket 41 supports a suitable solenoid 42 having an armature 43 which carries a pusher 44 normally positioned just beneath the level of the bottom surfaces of cleats conveyed by belts 25. When solenoid 42 is energized as by closing a suitable circuit supplying power to the solenoid, armature 43 moves upwardly causing pusher 44 to move upwardly slightly to lift cleats above the pusher from belts 25 and to hold them against the clamping plate 203 as shown in Figure 1. In this manner further movement of cleats from cleat turning section B^3 is stopped by the cleats held between pusher 44 and clamping plate 203, but belts 25 continue to move cleats that are beyond pusher 44 onto the tray completely to fill it.

The operator normally will operate solenoid 42 when only those cleats between pusher 44 and tray 38 are needed to fill the tray, so that when the cleats are stopped belts 25 fill the tray by moving the free cleats onto the tray. The cleat trays may be stacked on a suitable truck or may be carried directly to cleat dispensing mechanism shown in Figures 3 and 4 which will now be described.

Turning to Figure 4, the cleat dispensing mechanism comprises a cleat magazine M having two sections M^1 and M^2, and two cleat dispensing hoppers H and H′—one for each of the sections of the magazine, and which hoppers respectively feed the two sides of conveying mechanism conveying cleats to the stapling mechanism.

Figure 3 shows in outline a wirebound box making machine such as is shown in the above-mentioned patent. Conveyor bands C convey cleats and side material to stapling mechanism shown at the right. As shown in Figure 4, two conveyor bands are provided one for each side of the stapling mechanism. Beside the conveyor bands are tracks T for supporting the cleats. Spacer elements E are secured to the bands and serve to space the cleats and side material and to move them along with the conveyor.

Hopper H feeds cleats to the left conveyor band as shown in Figure 4, and hopper H′ feeds cleats to the right conveyor band.

Turning now to the magazine construction it assures a constant supply of cleats to the hoppers. The magazine is arranged to stack a number of loaded cleat trays, and automatically to unload the bottom cleat tray and dispose of the tray as the load of the previous tray is exhausted. The cleat trays stacked one above the other successfully deposit their full load of cleats on V-conveyor belts which convey the full load forwardly to the cleat hopper, and upon the removal of the last of the cleats of the load, the next succeeding tray deposits its full load on the conveyor.

The magazine comprises open framework made up of longitudinal base members 67 spaced apart by suitable cross members 66 (Figure 3) and supported by suitable legs 65 and 68 (Figures 3 and 5). V-belts 80 are trained about forward pulleys 81 keyed to a shaft 82 supported and journaled in bearings 83 supported from legs 68 as shown in Figure 5. Rearwardly, belts 80 are trained about idler pulleys 84 of smaller diameter, freely rotatable on short shafts 85 (Figure 4), secured by nuts 87 in elongated slots 86 (Figure 5) in longitudinal base members 67. Adjustment of shafts 85 along slots 86 serves to keep tension on belts 80. Drive shaft 82 is driven by sprocket 131 keyed to the shaft and driven by a suitable chain 130 from a sprocket 128 (Figure 3) secured to shaft 129 extending from speed-reducing unit 126, which, in turn, is driven by shaft 125, coupling 127, shaft 124, and motor 123.

Belts 80 support a considerable portion of the weight of the cleats and trays stacked in the magazine, and in the present construction (as shown in Figures 4 and 5) the underside of the belts are supported by anti-friction means. To this end, under and aligned with each belt is a series of rollers 88 on which the undersides of the belts rest. Each series of rollers 88 are freely mounted on spacer bushings 90*a*. Bolts 90 pass through longitudinal supporting members 91 and through the bushings, and hold the members and bushings together as a unit (Figure 4). Each outer member 91 is supported from its base member 67 by fingers 92 extending upwardly from brackets 93 secured to the base member 67 by bolts 94.

The trays above the bottom tray merely rest one on the other. The rearward end of the bottom tray is supported on a cross plate member 70 supported at each end by short uprights 71 secured to and extending upwardly from base members 67. The forward end of the bottom tray is supported by cleats which have previously been deposited on belts 80. The trays are aligned laterally by a vertical plate 73 whose respective vertical edges 74 and 75 provide stops against which the rearward ends of the trays of both magazines are pushed. The forward ends of the trays are laterally aligned by vertical angle irons 79, which form also stops for the forward ends of the trays to align the trays longitudinally. A longitudinal vertical wall 72 divides the two magazines and is supported at its rearward end by the plate 73, and at its forward end by a transverse member 76 fastened to upright members 77 extending upwardly from and secured to base members 67 by bolts 78.

Referring to magazine M^1, the trays thus aligned are supported so that they lie above and between belts 80 of the magazine, and are so arranged that when the last cleat of a load is conveyed from under the forward end of the tray resting on the cleats, as shown in Figure 6, the forward end of the tray drops between the belts permitting the tray to deposit its full load on the belts and permitting the tray to fall free from the magazine, as shown in Figure 5.

The cleat that is being moved from under the end of the tray it is supporting has a tendency to turn on its axis. To prevent such turning, as shown in Figure 6, guides 76*a* are provided just above the cleats, and aligned with belts 80. Guides 76*a* are secured to cross member 76. The ends 76*b* of the guides are turned upwardly so as not to catch on oncoming warped cleats, and stop short of the foremost cleat of the tray above, so that when the front end of the tray 33 falls, the ends 76*b* do not touch the falling leading cleat. The space between guides 76*a* and belts 80 is such as to allow free passage of properly positioned cleats, but is sufficiently small to prevent axial turning of a cleat located between the belts and guides.

For convenience in shifting the magazine from one place to another along the box-making machine, longitudinal base members 67 are secured to the legs 68 by bolts 69 which pass through slots in the ends of the members 67 so that by loosening the bolts the members 67 may be detached from legs 68, and the magazine as a unit may be withdrawn. Legs 68 are demountably fastened by bolts 95 (Figure 5) to a bearing plate member 96 positioned edgewise, and permanently secured to the outer side of framework of the box-making machine.

The belts 80 deliver the cleats to what are in effect hopper or stacking devices that give the cleats another quarter turn, and stack them above tracks T along which the cleats are moved by conveyor bands C of the box-making machine.

Referring to Figure 5, the left hand hopper mechanism H will be described. It is supported on legs 68 by means of upper and lower horizontal bars 98 demountably attached to legs 68 by bolts 99. The lower bar 98 rests on top of plate member 96. Horizontal bars 98 not only support the hopper, but also support cleat guiding parts to be described.

Suitably bolted to bars 98 are end plates 100 that laterally align cleats in the hopper. Bolted to end plates 100 by bolts 102 and extending inwardly from the end plates are sets of upper and lower supporting bars 103 (Figures 4, 5 and 7), which support a pair of outer cleat guides 104 (Figure 5).

As shown in Figure 4, the cleat guides are aligned with belts 80, and as shown in Figure 5, they extend upwardly from a point above one side of track T, thence on a path concentric with pulleys 81, and back over belts 80, forming therewith a cleat guideway such as described in connection with Figure 1. The guideway takes the cleats from belts 80, turns them through 90° and stacks them above track T.

Inner cleat guides 101 are supported on bars 98 as shown in Figure 5. They are spaced opposite the outer cleat guides and their tapered ends extend upwardly to the horizontal centerline of pulleys 81. They form with cleat guides 104 a trough through which the cleats freely fall, but which holds the cleats in proper alignment above track T, and prevents accidental axial turning of the cleats.

Side plates 105 (Figure 5) are bolted to the tops of end plates 100, and extend rearwardly to insure lateral alignment of the cleats as they move under outer cleat guides 104.

Inner cleat guides 101 are accurately aligned with the sides of track T so that a cleat held against guides 101 will fall in proper position on track T. To insure the cleats being in contact with guides 101 before the cleats drop onto track T, leaf springs 106 are secured to brackets 108 mounted on cleat guides 104. Springs 106 press inwardly against the cleats as shown in Figure 8 to hold them against inward cleat guides 101.

In normal operation to start the cleat dispensing mechanism in operation the operator will first fill the hopper dispenser with properly arranged cleats and will then hold a loaded tray above the mechanism and permit it to drop and deposit its load on belts 80. The cleats thus positioned on belts 80 support the forward ends of cleat trays that the operator then piles one above the other in the magazine. When the belts 80 are started, the friction between the belts 80 and the cleats is so much greater than the friction between the cleats and the bottom tray supported by the cleats that the cleats move forwardly with the belts continuously to keep the hopper full of cleats. In normal operation belts 80 are driven at a speed such as to tend to carry cleats forwardly to the hopper at a rate slightly greater than the rate at which cleats are removed from the bottom of the hopper as will be described.

As shown in Figures 7 and 8, the spacer and pusher element E secured to band C have lateral arms E′ extending over track C to engage the rearward ends of the successive cleats to move them forwardly along track T. The successive cleats as they are thus engaged are removed from the bottom of the stack of cleats in hopper H by being pushed from under the stack, the forward end plate 100 serving to hold back all the cleats above the cleat being removed from the bottom.

In the event that two cleats move under the end wall 100, as may happen when warped cleats are used, the lower end of forward end plate 100 has a hinged section or gate 116 pivoted about a pin 117 (Figure 8) in end plate 100. The gate is yieldingly held in its normal position by a spring 120 attached to a stop bar 119 carried by the gate 116, and at its other end to a stud 121 on the lower end of the adjacent cleat guide 104. Stop bar 119 extends beyond gate 116 and contacts the edges of end plate 100 and determines the normal position of the gate as shown in Figure

7. The gate, as shown in Figure 8, is inserted in a rectangular slot in plate 100.

In the event that two cleats force their way under gate 116 instead of jamming and stopping the mechanism or otherwise breaking it, gate 116 yields and moves to its dotted line position as shown in Figure 7 to permit two cleats to pass through. Thus, even though the extra cleat will be discarded, i. e., will not pass on to the stapling mechanism, no damage will be done to the mechanism.

It has been discovered that removal of two cleats at once may be largely eliminated by providing a two level support for the bottom cleat above track T. To accomplish this a plate 110 is secured to track T and is so positioned that the bottom cleat delivered from the hopper rests at its forward end on the track T, but its rearward end is held above the track by plate 110 as shown in Figure 7. When a cleat drops on this two-level support, the weight of the cleats above invariably forces the front end down and the rearward end up so that the arm E' always engages the cleat below its upper end, and assures that arm E' cannot catch the underside of the cleat above that to be removed.

As the bottom cleat is moved forwardly beyond plate 110, the pressure of the cleats in the stack forces the cleat down over the arm E' that is removing the cleat and into its final position within the arm E' as shown in dotted lines in Figure 7.

Further precaution is made to have the arm E' engage the cleats below the top edge of the bevels of the cleats by holding arms E' against rising above a predetermined level. To accomplish this a bar 111 (Figures 5 and 7) is secured to the under surface of the outer ends of brackets 112 supported from the lower outside surface of plate 100. The bar overhangs the arms E' and is spaced above the track T to permit arm E' to pass under the bar but to prevent the arms from rising as they engage the cleats.

The above construction feeds cleats continually from the magazine to the stack of cleats in the hopper, and the cleats are continually removed from the hopper one by one by the spacer elements and are conveyed along the track to the stapling machine. The intermittent tipping oscillation of the cleats in the stack above track T caused by the bottom cleats successively first resting on the plate 110 and then moving off the plate, keeps the cleats in the stack continually shifting, and this movement tends to prevent jamming of the cleats in the stack.

Referring to Figures 4 and 5, the right dispensing hopper H^1 is attached to the right side of the conveyor mechanism of the box-making machine, as shown in Figure 4, by vertical plates 133 bolted to side frame 300 of the box-making machine by bolts 133a (Figure 3). The construction of hopper H^1 is similar to that of hopper H. Such differences as there are, are in the location of the cleat guides. The left hand cleat guides 122 correspond to cleat guides 104 of hopper H, but extend upwardly and rearwardly in the plane of belts 80. Right hand cleat guides 132 correspond to cleat guides 101, but extend upwardly and rearwardly above the plane of belts 80.

Cleat guides 132 are supported from plate 133, and cleat guides 122 are supported from a pair of horizontal bars 134 secured to end plates 135, suitably secured by bolts 136 to vertical plates 133.

As before, cleat guides 122 and 132 are aligned and form a channel of passageway receiving cleats from section M^2, turning the cleats through 90°, and stacking them above the right hand track T. End plates 135 and upper side plates 137 secured to and extending rearwardly from the upper ends of plates 135 serve to keep the cleats in the channel in lateral alignment.

Inasmuch as the space between the pulleys 81, the section M^2, and the dispensing hopper H^1 is a variable distance depending on the width of the box being made, structure is provided to bridge the gap between the delivery point of belts 80 and the receiving point of guides 122. In the present embodiment this is accomplished by extending guides 122 rearward, as shown, and by providing rails 114 supported from the inner longitudinal members 91. Rails 114 lie inside guides 122 and when hopper H^1 is mounted close to hopper H, as when a narrow box part is being fabricated, the rails and guides may be effectively telescoped. The length of the rails and guides is such as to permit the closest mounting of hoppers H and H^1 that may be expected, and to cover between them the greatest space that may be expected when hoppers H and H^1 are mounted farthest from each other.

Since many embodiments might be made of the present invention and since many changes might be made in the embodiment disclosed herein, it is to be understood that the foregoing description is to be interpreted as illustrative only and not in a limiting sense.

We claim:

1. Cleat feeding apparatus for feeding cleats to a stapling machine having cleat-pushing elements moving along a path and cleat-supporting means extending parallel to said path for supporting cleats moved by said elements, in combination, upstanding side guides holding against lateral movement cleats stacked above and aligned with said cleat-supporting means, an upstanding end guide for preventing forward movement of all but the bottom of said stack of cleats, whereby as successive cleat-pushing elements engage successive bottom cleats said cleats are moved from beneath the stack, a stationary cleat-supporting surface positioned above said cleat-supporting means rearward of the vertical center line of said stack of cleats and below the path of said cleat-pushing elements for maintaining the rearward end of the bottom cleat of the stack above said cleat-supporting means while leaving its forward end on the cleat-supporting means, thereby to cause the successive cleat-pushing elements to engage the ends of the successive bottom cleats below the top edges thereof.

2. Cleat feeding apparatus for feeding cleats to a stapling machine having cleat-pushing elements moving along a path and cleat-supporting means extending parallel to said path for supporting cleats moved by said elements, in combination, upstanding side guides holding against lateral movement cleats stacked above and aligned with said cleat-supporting means, an upstanding end guide for preventing forward movement of all but the bottom of said stack of cleats, whereby as successive cleat-pushing elements engage successive bottom cleats said cleats are moved from beneath the stack, a cleat-supporting surface located beneath said stack and below the path of said cleat-pushing elements but above said cleat-supporting means for holding the bottom cleat of said stack raised to maintain the top edge of the rearward end of said cleat above the path of said cleat-pushing elements

thereby to preclude the possibility of a cleat-pushing element engaging two cleats at a time.

3. Cleat feeding apparatus for feeding cleats to a stapling machine having cleat-pushing elements moving along a path and cleat-supporting means extending parallel to said path for supporting cleats moved by said elements, in combination, upstanding side guides holding against lateral movement cleats stacked above and aligned with said cleat-supporting means, an upstanding end guide for preventing forward movement of all but the bottom of said stack of cleats, whereby as successive cleat-pushing elements engage successive bottom cleats said cleats are moved from beneath the stack, a cleat-supporting surface located beneath said stack and below the path of said cleat-pushing elements but above said cleat-supporting means for holding the bottom cleat of said stack raised to maintain the top edge of the rearward end of said cleat above the path of said cleat-pushing elements thereby to preclude the possibility of a cleat-pushing element engaging two cleats at a time, and said side and end guides being formed to allow the weight of said stack of cleats to bear upon the bottom cleat of said stack as it is moved from beneath said stack whereby to cause said bottom cleat to move into full contact with said cleat supporting means after it clears said supporting surface.

4. Cleat feeding apparatus for feeding cleats to a stapling machine having cleat-pushing elements moving along a path and a track parallel to said path for supporting cleats moved by said elements, in combination, upstanding side guides holding against lateral movement cleats stacked above and aligned with said track, an upstanding end guide for preventing forward movement of all but the bottom of said stack of cleats, whereby as successive cleat-pushing elements engage successive bottom cleats said cleats are pushed from beneath the stack and along said track, a cleat-supporting surface positioned above said track rearward of the vertical center line of said stack of cleats and below the path of said cleat-pushing elements for maintaining the rearward end of the bottom cleat of the stack above said track while leaving its forward end on the track, thereby to cause the successive cleat-pushing elements to engage the ends of the successive bottom cleats below the top edges thereof, and said side and end guides being formed to allow the weight of said stack of cleats to bear upon the bottom cleat of said stack as it is moved from beneath said stack whereby to cause said bottom cleat to move into full contact with said cleat supporting means after it clears said supporting surface.

5. For use in apparatus for feeding asymmetrical, similarly oriented, cleats to a box-making-machine having cleat-supporting means and cleat-moving and spacing elements, in combination, mechanism located adjacent said cleat-supporting means for stacking and unloading racks supporting crosswise thereon similarly oriented cleats, said racks being narrower than the cleats, said mechanism including a rear rack support and a forward rack stop, a conveyer extending beneath said rack support and rack stop and open below said rack for conveying forwardly successive layers of cleats deposited thereon by successive racks dropping therepast, said conveyer and the cleats thereon supporting the forward end of the rack directly above, whereby as said conveyer moves the last cleat received from the preceding rack from under the forward end of the rack supported by the cleat, the forward end of the rack drops free through said conveyer to deposit on the conveyer the cleats carried by the rack.

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