Oct. 21, 1952 G. E. STILWELL 2,614,252

SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

Filed Sept. 9, 1950 9 Sheets-Sheet 1

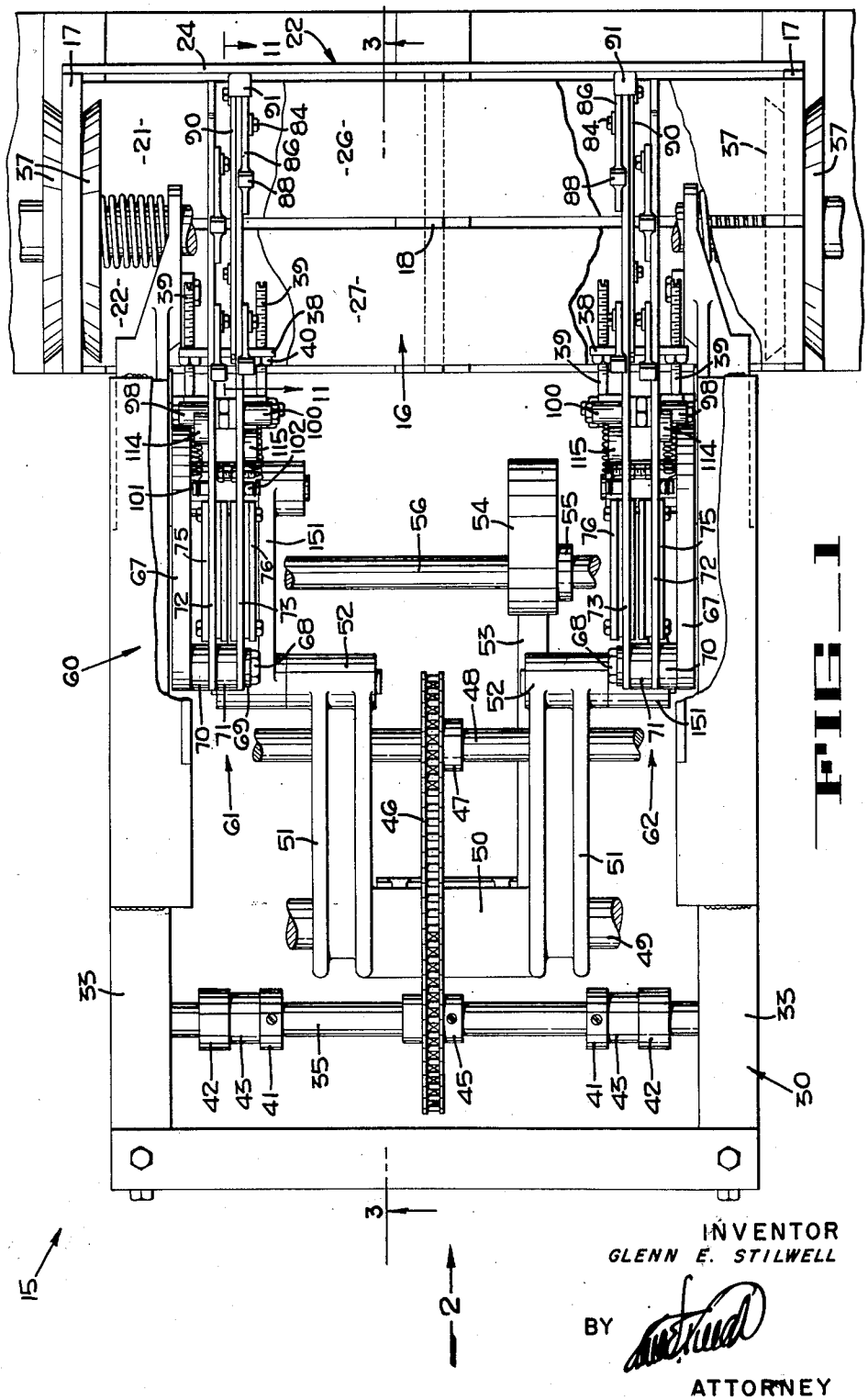


FIG. 1

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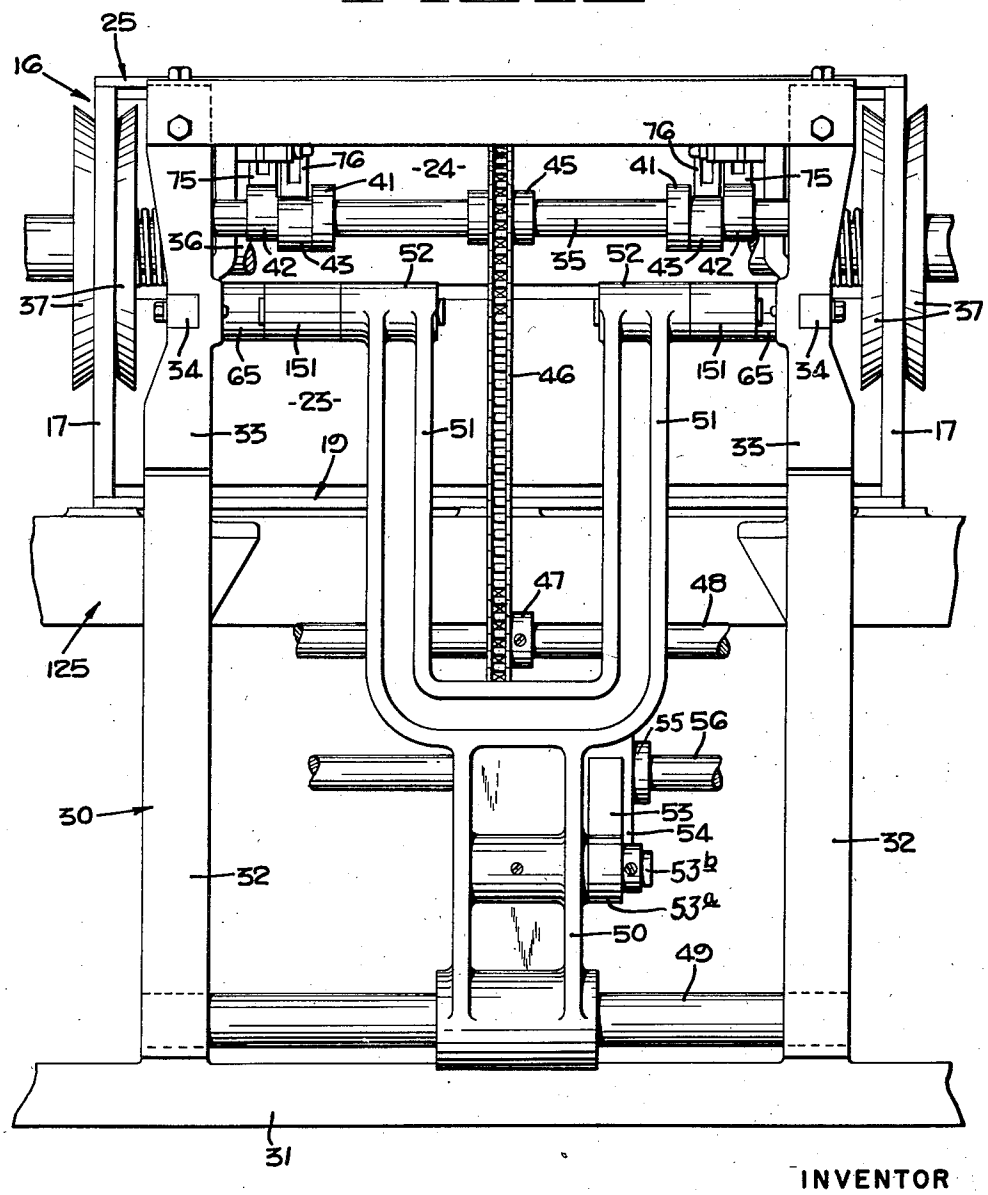
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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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FIG_2




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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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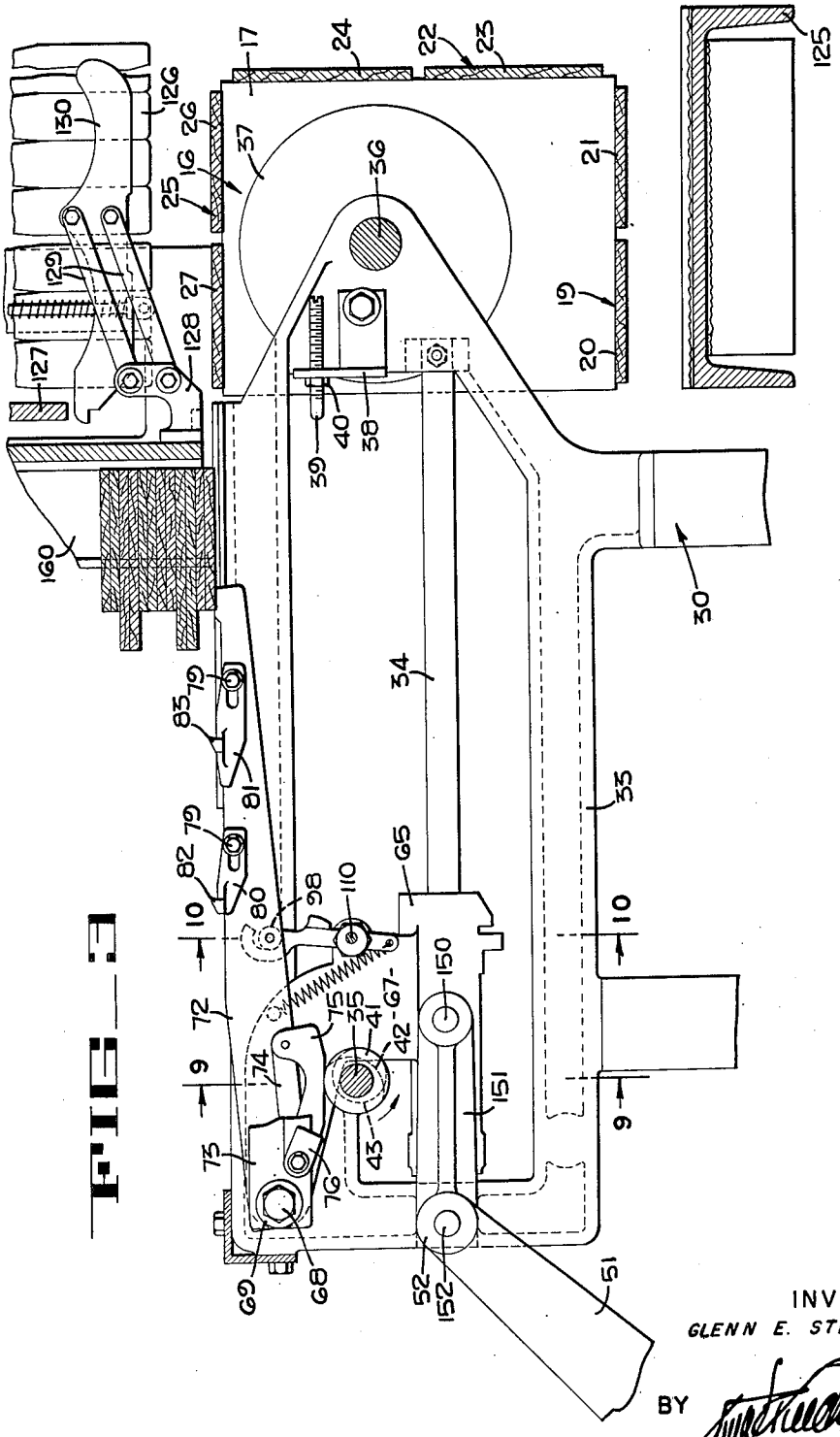


FIG. 3

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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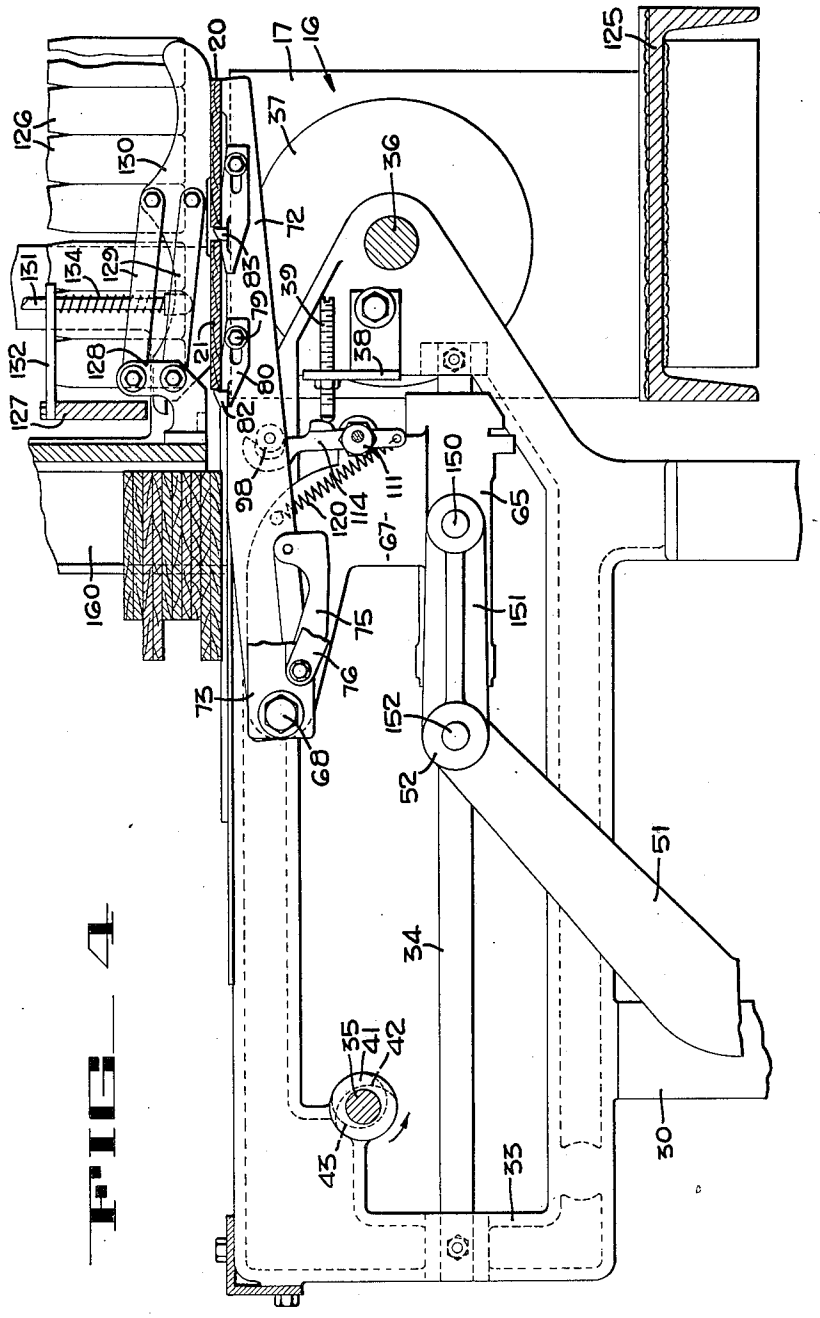



FIG. 4

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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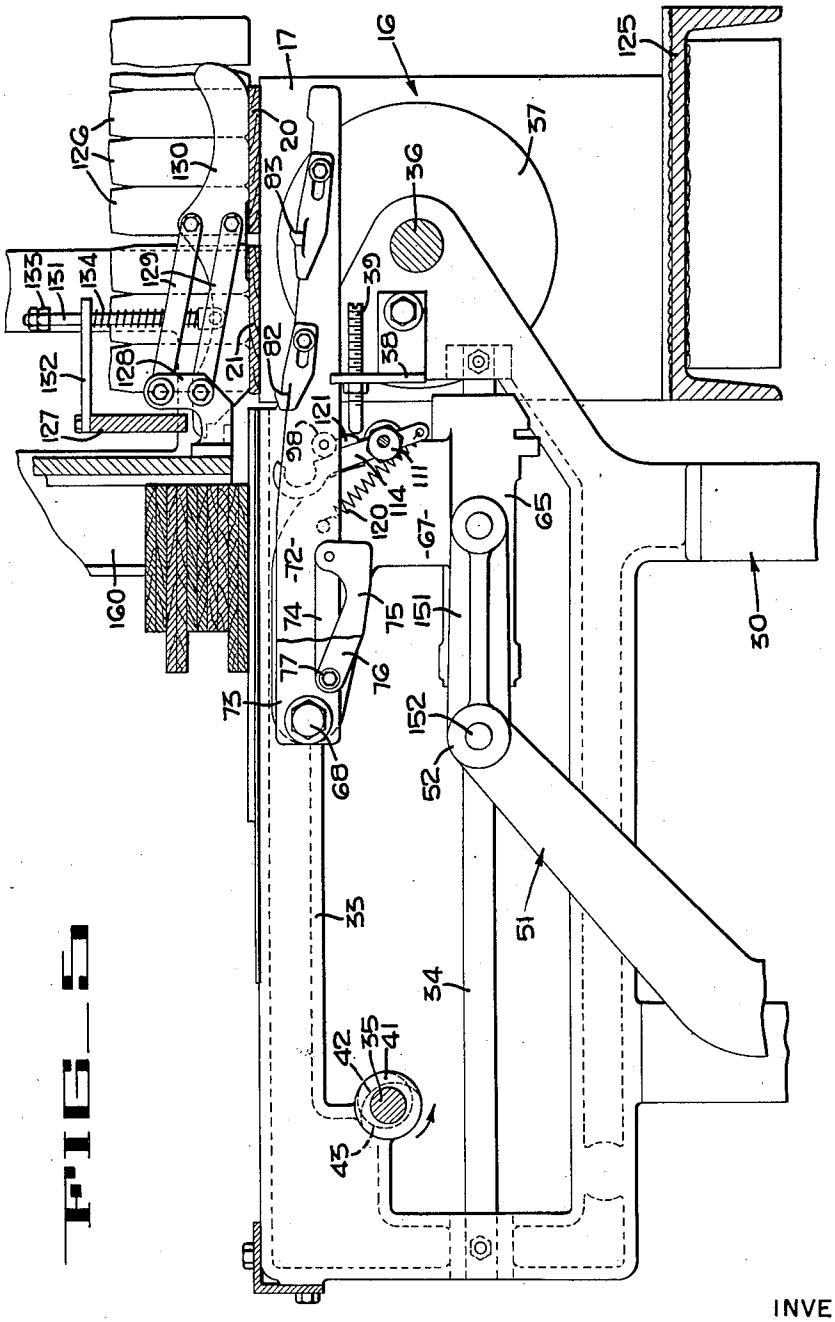



FIG. 5

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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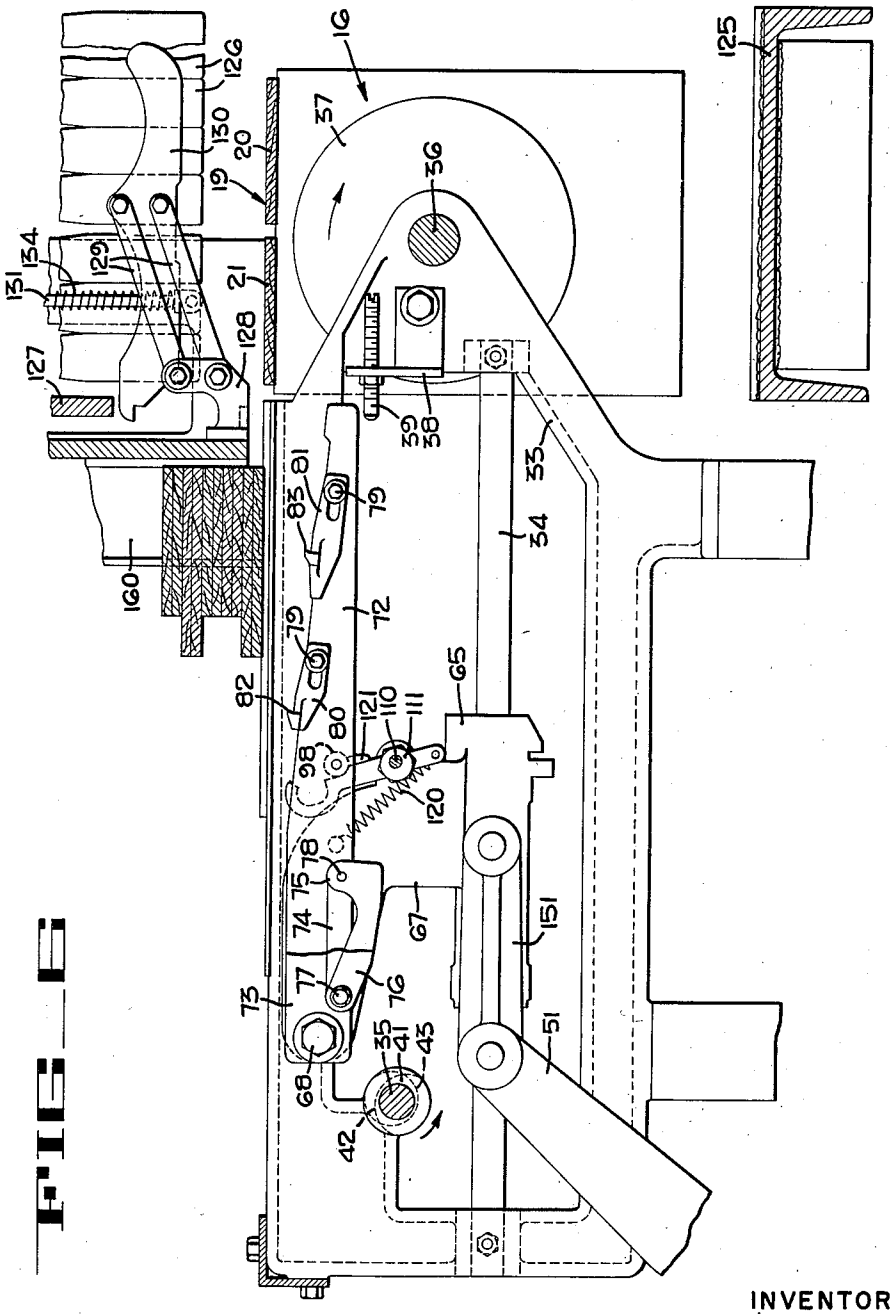



FIG. 6

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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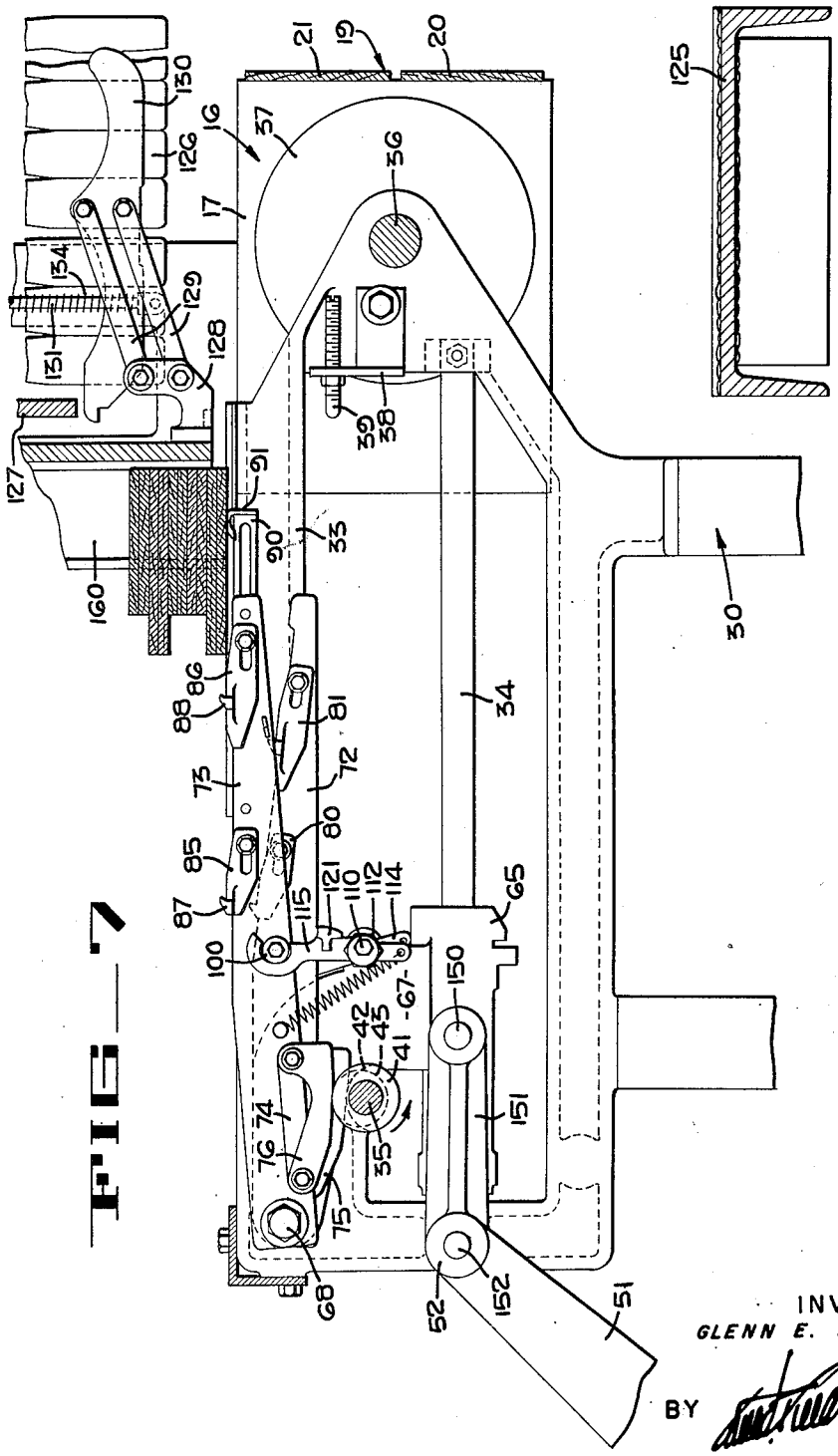



FIG. 7

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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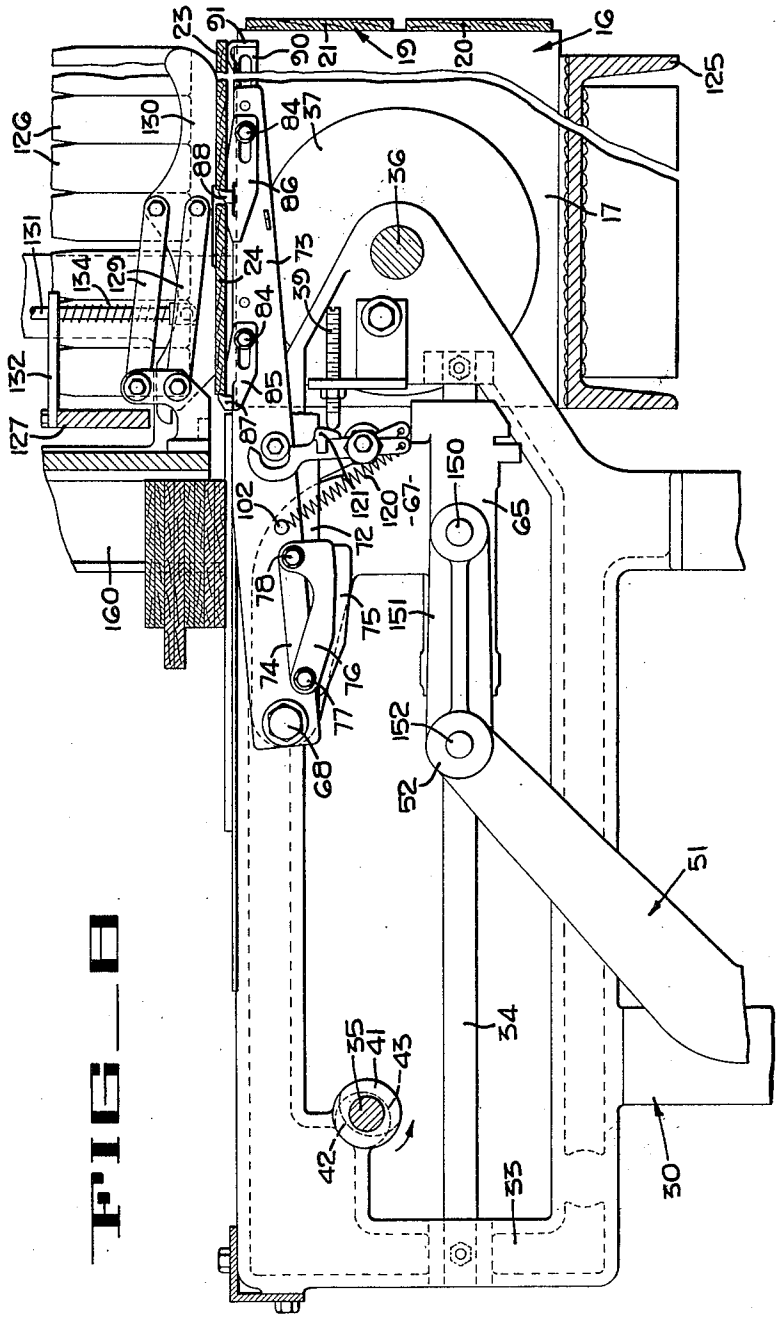



FIG. 8

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SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

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FIG. 10

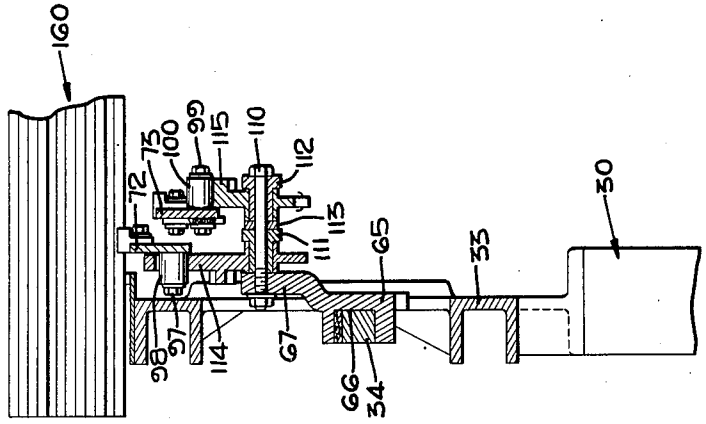



FIG. 11

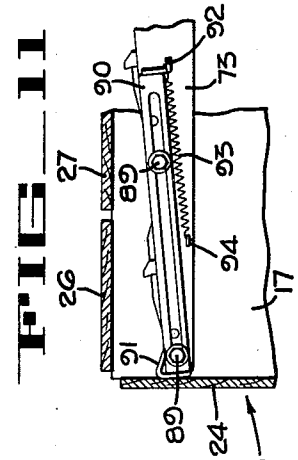
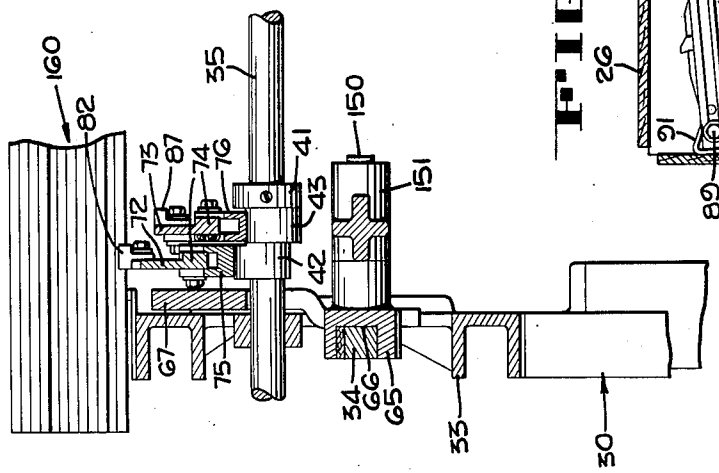



FIG. 9




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Patented Oct. 21, 1952 2,614,252

# UNITED STATES PATENT OFFICE

2,614,252

## SIDE AND BOTTOM SLAT FEED FOR AUTOMATIC BOXMAKING MACHINES

Glenn E. Stilwell, Riverside, Calif., assignor to Food Machinery and Chemical Corporation, San Jose, Calif., a corporation of Delaware

Application September 9, 1950, Serial No. 184,039

5 Claims. (Cl. 1—14)

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This invention relates to automatic box making machines and is particularly useful in a machine for making a box the sides and bottom of which differ in width. It is accordingly disclosed herein for illustrative purposes as incorporated with a lemon box making machine of the automatic type disclosed in U. S. Letters Patent No. 1,844,333 issued on February 9, 1933, to Elmer C. Northrup.

A lemon shipping box is slightly wider than its depth and two slats are used to form the bottom and each side of the box. The slats for the bottom are thus wider than the side slats and require a separate arrangement for feeding these into place for nailing to the box heads and center partition than is required for feeding the slats into place for forming each of the sides.

The slat feeding device shown in said Northrup patent has been widely used, this employing a pair of rotating mandrels each having three sets of slat feeding dogs, these sets being spaced 120° apart around each mandrel, these mandrels being reciprocated beneath the slat magazine and over the box assembling station and being intermittently rotated one-third of a revolution to dispose different sets of dogs upwardly in slat engaging positions for feeding the first side, the bottom, and the second side successively to said station.

Although honored by long service in the box making industry, this rotary slat feed contained certain inherent weaknesses, particularly in the intermittent rotating mechanism, which made it a maintenance problem.

It is, accordingly, an object of this invention to provide a side and bottom slat feed for automatic box making machines which will be simple and positive in operation, rugged in construction, and relatively free from maintenance difficulties.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a diagrammatic plan view of the invention as preferably embodied in an automatic box-making machine with portions of said machine broken away to render visible the elements of the invention. This view shows the invention at the point in the operation thereof when it is just delivering a second side to a box being made in said machine, portions of said second side also being broken away to illustrate portions of the invention disposed beneath said side, this view also illustrating the telescoping of the extensions provided on the ends of the bottom slat feeding arms of the invention by the engagement of said extensions with the bottom of the box.

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Fig. 2 is a rear elevation of Fig. 1 taken in the direction of arrow 2.

Fig. 3 is a vertical longitudinal sectional view taken on the line 3—3 of Fig. 1 and illustrates the invention at the point in the operation thereof which closely follows that illustrated in Fig. 1, and at which the completed box is still gripped by the clamping discs of the machine but is about to be expelled from the machine by the feeding of a new set of heads and center partition into place for starting to make another box, and at which point crosshead is in its retracted position with the side slat feeding arms elevated and latched in their raised position for stripping a pair of side slats from the slat magazine.

Fig. 4 is a view similar to Fig. 3 and illustrates the invention at the point in the operation thereof which closely follows that shown in Fig. 3 and at which the cross head has returned to its slat delivering position with the side slat feeding arms still raised and delivering a pair of side slats into the proper position to be nailed on to the box heads and center partition to form the first side of the new box. This view shows the crosshead just before reaching its rightwardmost position and with the latch of the side slat feeding arm shown in this view engaged by a stationary trip element which is tripping said latch so that, as said crosshead reaches its rightwardmost position, said side slat feeding arms will be unlatched and allowed to drop to lower said side slats on said heads and middle partition and be clear of said slats in readiness for withdrawal when the crosshead returns to the left.

Fig. 5 is a view similar to Fig. 4 and illustrates the unlatching of the side slat feeding arms of the invention immediately following the point in the operation of the invention shown in Fig. 4.

Fig. 6 is a view similar to Fig. 5 and illustrates a point in the operation of the invention at which the crosshead is returning to the left from having delivered the first side in position for assembly with the new box, the anvil for supporting the box during nailing operations being shown as lowered, and the nail chucks and slat depressors being shown as raised to permit the partially assembled box to be rotated automatically by the rotating clamping discs to position the unfinished box for the application of a bottom thereto.

Fig. 7 is a view similar to Fig. 6 and shows a point in the operation of the invention closely following that illustrated in Fig. 6 and in which the crosshead has reached its leftwardmost position lifting the bottom slat feeding arms of the invention which are thereupon latched in their upper positions in readiness for stripping a pair

of bottom slats from the bottom of the slat magazine, the new box being shown in this view as having been turned 90° and extending leftward from the proper position in which it should be located for applying a bottom thereto.

Fig. 8 is a view similar to Fig. 7 and illustrates a point in the operation of the invention closely following that shown in Fig. 7 and in which the crosshead has returned almost to its rightward-most position and with the latches supporting the bottom slat feeding arms about to be engaged by trip elements whereby the said arms will be unlatched and allowed to drop into lowered positions thereby depositing the bottom slats on the heads and center partition of the new box and permitting the withdrawal of said feeding arms with the crosshead when it returns to its leftward retracted position.

Fig. 9 is a vertical cross-sectional detailed view taken on the line 9—9 of Fig. 3 and illustrating the construction of the cam engaging shoes of the invention and the manner of their attachment on to the slat feeding arms thereof.

Fig. 10 is a vertical sectional detailed view taken on the line 10—10 of Fig. 3 and illustrating the manner of mounting a pair of said latches on one of the crossheads of the invention.

Fig. 11 is a vertical sectional detail view taken on the line 11—11 in Fig. 1 and illustrating the manner in which the extensions of the ends of the bottom slat feeding arms are telescoped by engagement with the bottom of a box being made in said machine at the time said arms are in their forward positions during the feeding of a pair of side slats into place for the formation of the second side applied in the manufacture of a box.

Referring specifically to the drawings, the invention is there shown as embodied in an automatic box-making machine 15 which, for illustrative purposes, is shown as a machine of the type illustrated in the aforesaid Northrup patent. As reference may be had to said patent for a full description of a box-making machine of this type, only such details of said machine are shown in the accompanying drawings as are necessary to illustrate the manner in which the present invention is incorporated with and functions within said machine.

The machine 15 is adapted for making a lemon box 16, having two end heads 17, a center partition 18, a first side 19 comprising side slats 20 and 21, a bottom 22 comprising bottom slats 23 and 24, and a second side 25 comprising side slats 26 and 27. The machine 15 has a frame 30 including a base 31 having legs 32 on the upper ends of which are supported rectangular frames 33 within each of which is fixed a crosshead slide bar 34. Frames 33 also have bearings in which are journaled a shaft 35 and a series of short shafts 36, the latter series of shafts having clamping discs 37 mounted thereon and being included in the automatic clamping mechanism disclosed in said Northrup patent for clamping the heads and center partition of each box while it is being assembled in machine 15 and for turning the partially completed new box to correctly position the work for the successive application thereto of the first side 19, bottom 22 and second side 25 in the order named.

Mounted on inner faces of the frames 33 near their forward ends are brackets 38, these having tapped horizontal holes through which are screwed rods 39 bearing lock nuts 40 and which act as latch trips.

The shaft 35 (Fig. 3) is the equivalent of "shaft 77" shown in said Northrup patent and is rotated constantly in a counterclockwise direction so as to make one revolution during the three operations comprising a box-making cycle. This shaft has fixed thereon a pair of collars 41 each of which has cams 42 and 43 formed integral therewith. The cam 42 has a high face which is concentric with shaft 35 and approximately 170° in length. The cam 43 is formed symmetrically with reference to cam 42 and has a high face disposed diametrically opposite to the high face of cam 42 and approximately 50° in length. Shaft 35 is provided with a sprocket 45 through which the shaft is driven by a chain 46 which is trained about sprocket 45 and a sprocket 47 on a shaft 48 of the power drive mechanism of the machine 15.

Mounted in suitable bearings on the base 31 is a heavy shaft 49 (Figs. 1 and 2) carrying a bifurcated arm 50 which is divided into two arms 51, these arms terminating in bearings 52. The arm 50 is oscillated by a pitman 53 (Figs. 1 and 2), having at one end a bearing 53*a*, which a pin 53*b* connects pivotally to arm 50, and at its other end, a collar 54 surrounding an eccentric 55 on a shaft 56 of the drive mechanism of the machine 15. The latter shaft rotates once for each nailing operation in the making of the box so as to cause the arm 50 to oscillate back and forth about shaft 49 once for each nailing operation.

Slidably supported on the slide bars 34 and reciprocated on these in response to oscillation of the arm 50 on the shaft 49 is a side and bottom slide feed mechanism 60 which is made up of right and left units 61 and 62 which are reverse duplicates of each other so that a description of the unit 61 will suffice for both.

Referring to Figs. 1, 3, 9, 10 and 11, the unit 61 is seen to comprise a cross head 65 having a recess 66 which receives the adjacent slide bar 34 to slideably relate the crosshead 65 with this bar. Extending upwardly and rearwardly from the crosshead 65 is an arm 67 which has a tapped hole near its upper rear extremity which receives a cap screw 68. A washer 69 is placed over this screw and a sleeve (not shown) is clamped between washer 69 and the arm 67. This sleeve provides an axle for hubs 70 and 71 of slat feeding arms 72 and 73 so that the rear ends of these arms are pivotally mounted on the crosshead 65 by the screw 68.

Each of the arms 72 and 73 (Fig. 9) are thickened inwardly along the lower edges thereof near their hubs 70 and 71 to provide thickened portions 74 to which channel shaped cam engaging shoes 75 and 76 are secured by cap screws 77 and 78. Secured to the inner face of side slat feeding arm 72 (Fig. 3) by cap screws 79 are slotted brackets 80 and 81 carrying slide slat feed dogs 82 and 83. Adjustably fixed to the inner face of the bottom slat feed arm 73 (Fig. 8) by cap screws 84 are slotted brackets 85 and 86 carrying bottom slat feed dogs 87 and 88.

Slidably secured to the outer face of the bottom slat feed arm 73 at its forward end (Fig. 11) by cap screws 89 is a slotted bar 90 having a slat supporting and bottom engaging shoe 91 on its forward end and a spring hook 92 on its rear end over which one end of a contractile spring 93 is looped, the other end of said spring hooking through the eye of a cotter key 94 secured in a suitable hole provided in the arm 73.

Rotatably mounted on the slat feed arm 72 (Fig. 10) by a cap screw 97 so as to extend outwardly from said arm near the middle thereof is

a roller 98. Similarly mounted on the arm 73 by a cap screw 99 so as to extend inwardly therefrom is a roller 100. Fixed on the arms 72 and 73 so as to extend outwardly and inwardly respectively therefrom at points just forward of the shoes 75 and 76 are spring anchoring pins 101 and 102 (Figs. 1 and 8).

The forward end of crosshead arm 67 is apertured to receive a bolt 110 (Figs. 7 and 10) which receives eccentric sleeves 111 and 112, a washer 113 between said sleeves and clamps said sleeves and washer against the arm 67 in rigidly assembled relation. Rotatable independently on the sleeves 111 and 112 are latches 114 and 115. The latch 114 extends upwardly just outside the slat feeding arm 72 and the latch 115 extends upwardly just inside of slat feeding arm 73. The latches 114 and 115 have hook shaped upper ends which are adapted to receive the rollers 98 and 100 respectively when the arms 72 and 73 are lifted and the latches 114 and 115 swung against said rollers. Each of the latches 114 and 115 extends downwardly below the hub thereof and their lower ends are connected by contractile springs 120 with the pins 101 and 102. The latches 114 and 115 are thus constantly spring urged about their pivotal mountings on the sleeves 111 and 112 so that when either of these arms is raised as shown in Figs. 3 and 7 it is automatically latched in raised position by one of the latches 114 and 115.

Each of the latches 114 and 115 is provided with a wear shoe 121 which is aligned with one of the latch trips 39 so this latch trip will engage said shoe 121 and disengage this latch from supporting relation with the feed arm supported thereby when the crosshead 55 reaches its forwardmost position as shown in Fig. 5.

The sleeves 111 and 112 are of an eccentric character so that these will provide a means for adjusting the level of the slat feeding arms 72 and 73 when these are held in upward position by the arms 114 and 115. This adjustment is effected by loosening the bolt 110 and rotating one of the sleeves 111 or 112 which because of the eccentricity of said sleeve lifts or lowers the latch mounted thereon. When the desired adjustment has thus been effected the bolt 110 is again tightened so as to rigidly hold both sleeves in the positions to which they have been adjusted.

Machine 15 includes an anvil 125 which is disposed below the work gripped between the respective pairs of clamp discs 37 and is raised automatically by suitable cams to support the work during nailing operations and is then lowered by said cams to permit rotation of the work in intervals between nailing operations.

The machine 15 also includes a nailing mechanism which is disposed above the work and has banks of nail chucks 126 which are automatically lifted above the work in the intervals between nailing operations and lowered on to the work in each nailing operation to position nails to be driven from the chucks into the work.

United with the same element which supports chucks 126 is a cross bar 127 which rises when the chucks are lifted and is lowered when they descend to accomplish a nailing operation. Pivoted on brackets 128 which are fixed to the frame 30 of the machine 15 just over each of the slat feed units 61 and 62 are a pair of links 129 which are pivotably connected with a slat depressing shoe 130. Pivotably attached at its lower end of each of these shoes is one of a pair of rods 131 which extends upwardly through a hole in an arm 132 which is fixed on the cross bar 127. The upper end of the rod 131 carries lock nuts 133, and an expansion spring 134 is coiled about said rod between its lower end and the arm 132 so as to apply a yieldable downward pressure during each nailing operation on the shoe 130 to which this rod is connected, so that this shoe will hold slats engaged thereby in the positions in which they were delivered for nailing to the box heads and center partition.

Each of the crossheads 65 is pivotally connected by a pin 150 to a link 151 which in turn is pivotally connected at its opposite end by a pin 152 to one of the bearings 52 of the oscillating arm 50. The oscillations of the arm 50, one of which takes place during each nailing operation of the machine 15, thus transmit rectilinear motion to the crossheads 65 causing units 61 and 62 to make one complete reciprocation back and forth on the guide bars 34 during each nailing operation.

Supported on the frame 30 of the machine 15 as shown in Figs. 3 to 8 inclusive is a slat magazine 160 for containing a stack of side and bottom slats which are placed therein in the proper order for being withdrawn from the lower end of the magazine by the mechanism 60 as these slats are required in the manufacture of boxes 16.

*Operation*

As disclosed in the aforementioned Northrup patent, the machine 15 operates continuously and automatically to perform successive nailing operations which are divided into cycles of three nailing operations each, a complete box being manufactured in each cycle. Thus, the final nailing operation of each cycle is followed immediately by the first nailing operation of the next cycle.

Fig. 1 illustrates the units 61 and 62 of the slat feed mechanism 60 in the act of delivering a pair of side slats for the third operation of a box-making cycle. In this view, the bottom slat feeding arms 73 are shown as released from latches 115 while the latches 114 are still supporting the side slat feeding arms 72 in their raised positions. The units 61 and 62 are here shown as almost in their extreme rightward position and with the outer latch trips 39 engaging the latches 114 so that completion of the rightward movement of said units trips latches 114 and thus allows the side slat feed arms 72 to drop to their lowered positions as shown in Fig. 5.

Just prior to this dropping of the slat feeding arms 72 to their lowered positions, the shoes 130 are lowered with the descending nail chucks 126 into contact with the slats 26 and 27 of the second side 25 of the box 16 being manufactured so that said slats follow said arms 72 downwardly until said slats rest on the heads 17 and center partition 18 of said box and they are then pressed against said heads and partition by said shoes 130. The nailing of slats 20 and 21 to the heads and center partition of the box follows immediately as the units 61 and 62 of the slat feed mechanism start rearwardly.

Fig. 3 illustrates the arrival of unit 61 in its rearwardmost position and shows one of the feed arms 72 again lifted to its raised position in readiness to feed side slats 20 and 21 into place for starting the manufacture of the box 16 to be made in the next following box-making cycle. The lifting of the arms 72 to their raised positions as shown in Fig. 3 results from the cams 42 on shaft 35 being turned with portions of their high faces disposed upwardly so as to be engaged

by the shoes 75 thereby elevating the arms 72 until the rollers 98 are opposite the hooked upper ends of latches 114 thereby permitting these latches to swing into latching relation with these rollers 98 as shown in Fig. 3.

As shown in Fig. 3 the anvil 125 is lowered and the chucks 126 and shoes 130 are raised during every interval between nailing operations. Inasmuch as a completed box 16 is gripped between the clamp discs 37 during the particular interval illustrated in Fig. 3, the side slat 20 at the lower left hand corner of the finished box shown in this view engages the frame 30, when this box has been rotated a small angle by the rotating clamp discs 37, thereby halting the rotation of the finished box 16 and causing the discs 37 to rotatably slide on the faces of the box heads and center partition disposed between said discs.

As is clearly disclosed in said Northrup patent, provision is made in the machine 15 for feeding a new set of heads and a new center partition behind and in alignment with the heads and center partition of the completed box 16 shown in Fig. 3, this occurring approximately at the point in the box-making cycle illustrated in Fig. 3. As the units 61 and 62 of the slat feed mechanism 60 move forward from the positions in which these are shown in Fig. 3 to the positions in which they are shown in Fig. 4, this new set of heads and center partition is fed forwardly against the heads and center partition of the finished box 16 shown in Fig. 3 so as to eject this box forwardly from the machine and introduce said new heads and center partition in the spaces between the respective pairs of clamp discs 37 in the precise positions necessary to have the slats 20 and 21 of a new box to be nailed thereon, these slats being shown in Fig. 4 as fed into place by the arms 72 of the feed mechanism 60. As also shown in Fig. 4, the anvil 125 has again been lifted into supporting relation with the heads and partition of the new box, this taking place as the chucks 126 and shoes 130 are being lowered to hold the slats 20 and 21 in place and nail these to heads and center partition of the new box.

Fig. 5 illustrates this nailing operation and the lowering of the arms 72 which has just preceded this in preparation for the return rearward of the slat feed units 61 and 62. It is to be noted that when the arms 72 are lowered they are supported in their lowered position by the rollers 98 resting on shoes 121 of the latches 114. By the same token, arms 73 are supported in their lowered positions by the rollers 100 resting on the shoes 121 of latches 115.

As the units 61 and 62 are retracted to the left as shown in Fig. 6, the anvil 125 is again lowered and the chucks 126 and shoes 130 are again lifted to permit the unfinished box gripped between the clamp discs 37 to be automatically rotated 90° into the position in which this box is shown in Fig. 7. Here it is seen that the work, including box heads and partition is not properly located under the chucks 126 for the performance of the next following nailing operation in which bottom slats 23 and 24 will be nailed on. This is taken care of, however, by the automatic operation of the head and partition feed means which engages the left edges of the box heads and partition, thus shifting the work into proper position for applying the bottom slats thereto, this being effected concurrently with the rightward movement of the slat feed units 61 and 62 so as to be concluded as shown in Fig. 8 with the work and bottom slats both in proper position for assembly in the nailing operation immediately following.

It will be observed in Fig. 7 that the cam shaft 35 is turned during the cycle of nailing operations being now described so that at this point in said operations the high points of cams 43 are now disposed upwardly and the high faces of the cams 42 are disposed downwardly whereby the high faces of cams 43 are engaged by shoes 76 so as to lift bottom slat feeding arms 73 to their raised positions in which they are automatically latched by their latches 115 as shown in Fig. 7. Owing to the high faces of cams 42 being disposed downwardly however, arms 72 are allowed to remain in their lowered positions when the units 61 and 62 are returned to the right as shown in Fig. 8. Thus, a pair of bottom slats 23 and 24 are fed into place, shifted downwardly onto the heads and center partition of the box, and nailed to said heads and center partition as the slat feeding units 61 and 62 are again returned to their retracted positions. The latter movement finds the cam shaft 35 further rotated to turn the high faces of the cams 43 downwardly and the high faces of the cams 42 up so that the latter faces will be engaged by the shoes 75 of the arms 72 thereby lifting these arms into their raised positions in readiness for feeding into place the side slats 20 and 21 of the second side 19 upon the next successive rightward movement of the units 61 and 62 as illustrated in Fig. 1.

The rotation of the work between successive side and bottom slat feeding operations is automatically accomplished by rotating shafts 36, carrying discs 37, by a chain (not shown) which connects said shaft with shaft 53. This chain corresponds to "chain 21" shown in Fig. 1 of the Northup Patent No. 1,844,333, above mentioned.

A complete cycle of the operation of the slat feed mechanism 60 of the invention has now been described and it will be seen from this description that I have provided a rugged and positively operating mechanism for feeding side and bottom slats into place for assembly with the heads and center partition of a lemon box, in a machine for automatically manufacturing such boxes, which is free from delicate elements and which will operate over long periods with relatively light maintenance costs.

When the side slats 20 and 21 are being delivered as shown in Fig. 1 for forming the second side 19 of a box 16, the telescopic extensions 90 of the arms 73 engage the bottom slat 24 and are thus telescoped on the arm 73 as shown in Fig. 11. By this device, arms 73 may give support to the extreme right edge of a bottom slat 23 as shown in Fig. 8, when this slat is delivered into place so that both slats 23 and 24 may be accurately positioned for being nailed to the box in the immediately following nailing operation, yet the telescopic character of arms 73 will permit these to yield when the ends thereof engage bottom slat 24 as the units 61 and 62 move to their rightwardmost positions in delivering slats 26 and 27 in place to form the final side 25 of the box 16.

The claims are:

1. In an automatic box-making machine the combination of: a frame; a slat magazine on said frame; crosshead means horizontally reciprocable on said frame between retracted and slat delivering positions; a horizontal cam shaft

rotatably mounted on said frame adjacent said retracted position; cams on said shaft; two pairs of slat feed arms pivotally mounted at their rear ends on said crosshead means, said arms being aligned respectively with and adapted to engage said cams to lift said arms when said crosshead means moves toward its retracted position; power means to reciprocate said crosshead means and rotate said shaft coordinately to position said cams to lift only one of said pairs of arms at a time and in a predetermined sequence; slat feed dogs on said arms for feeding slats from the bottom of said magazine when said arms are raised; means for latching each arm in raised position when said arm is lifted thereto by engagement with one of said cams; and means on said frame for releasing said latch means to lower the lifted pair of said arms when said crosshead means reaches said slat delivering position.

2. A combination as in claim 1 in which said shaft is rotated once for three reciprocations of said crosshead means, and in which said cams for one pair of arms operate to lift said pair during the first and third reciprocations of a box-making cycle, and in which the other cams operate to lift the other pair of arms during the second reciprocation in said cycle.

3. In an automatic box-making machine the combination of: a slat magazine; two independent pairs of slat feed arms, one pair being for side slats, the other pair being for bottom slats;



crosshead means slidably reciprocable in a horizontal plane and transversely relative to said magazine; means for mounting said pairs of arms on said crosshead means for vertical movement independent of each other; dogs on each pair of said arms for engaging and feeding slats from the bottom of said magazine when said pair is in a raised position; power mechanism for coordinately reciprocating said crosshead means relative to said magazine; means for selectively raising said pairs of slat feed arms for the feed strokes in successive reciprocations of said crosshead means; and means for lowering the lifted pair of arms for the withdrawal stroke of each such reciprocation.

4. A combination as in claim 3 in which cam means is provided for lifting said side slat feeding pair of arms for the feed strokes of the first and last reciprocations of a three-reciprocation cycle and lifting said bottom slat feeding pair of arms for the feed stroke of the second reciprocation of said cycle.

5. A combination as in claim 1 in which said latch means includes latches pivotally mounted on eccentric sleeves bolted to said crosshead means said sleeves being rotatable on their mounting bolts to adjust the height of the raised positions in which said latches hold said arms.

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No references cited.