

[54] CORNER BLOCK FORMING APPARATUS

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[51] Int. Cl. **B31b 1/12, B31d 1/00, B26d 3/06**

[58] Field of Search **93/1 R, 84 R, 49 R; 83/5; 156/211, 443, 510**

[56] References Cited

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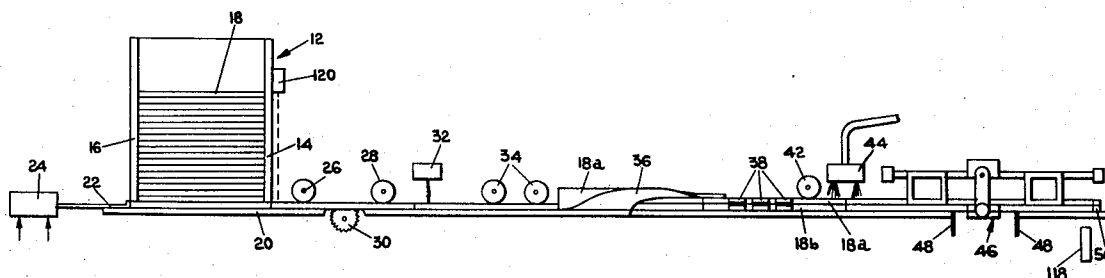
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[57] ABSTRACT

An apparatus for forming L-shaped corner posts having a hopper for dispensing seriatim multiple-ply boards of substantially uniform thickness throughout, cutting means which form an elongated groove in the board, the groove penetrating all but one ply of the board and leaving a hinge between two unequal portions. Glue is applied to the uncut surface of the board and the unequal portions of the board are folded about the hinge to form an L-shaped block. Squaring means align the cut edges of the unequal portions in a common plane while rollers compress the portions together so that uniformity of block shape is maintained. The L-shaped block has at least one of its surfaces sprayed with a protective coating and the block can then be cut into smaller lengths.

15 Claims, 5 Drawing Figures



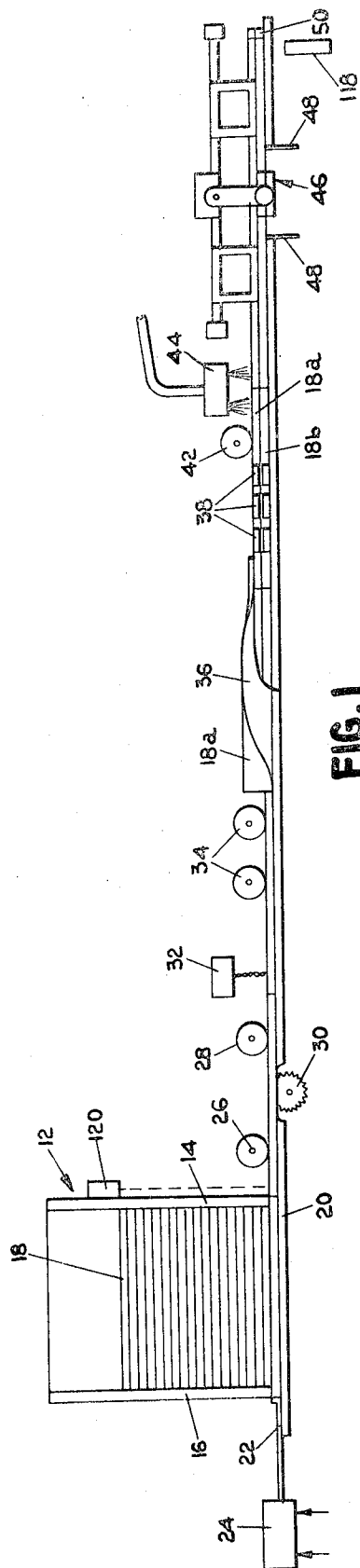


FIG. 1

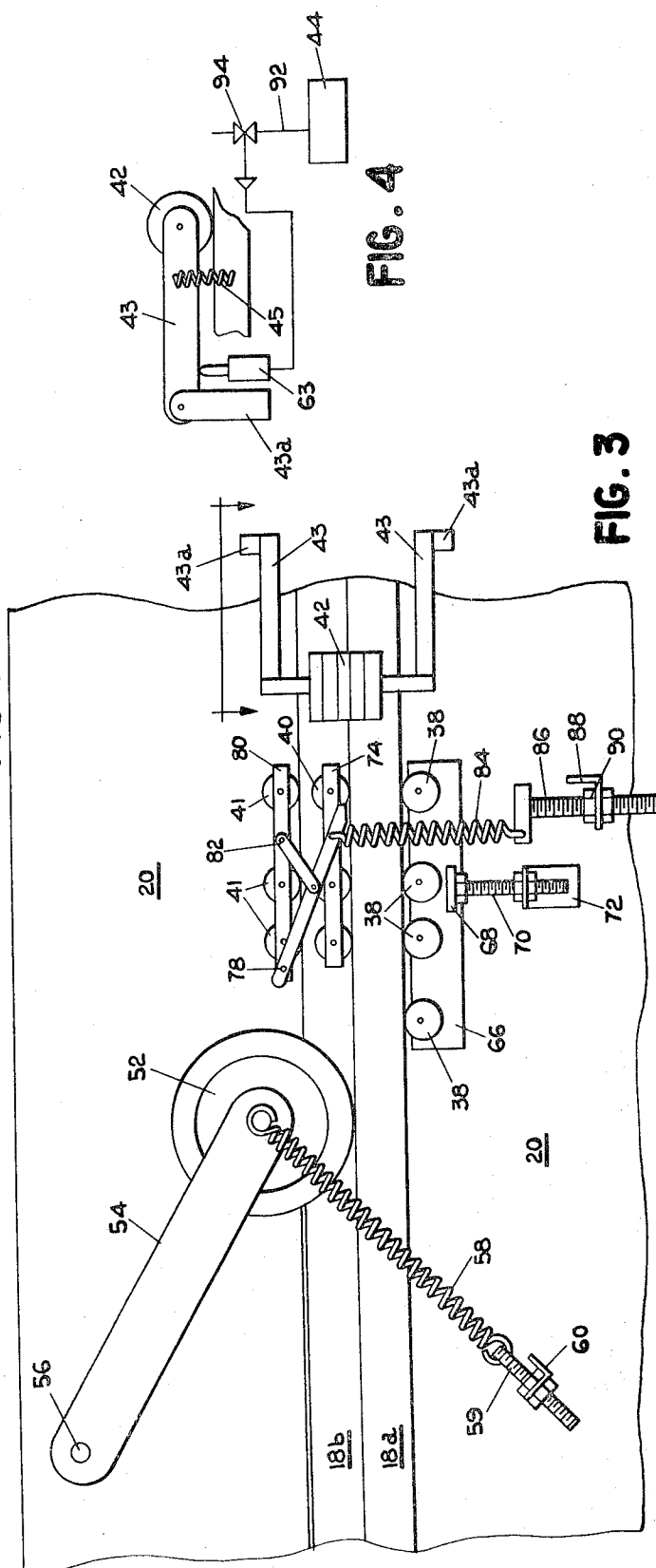


FIG. 3

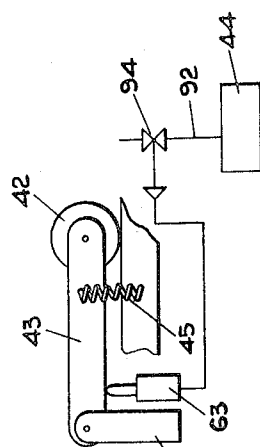


FIG. 4

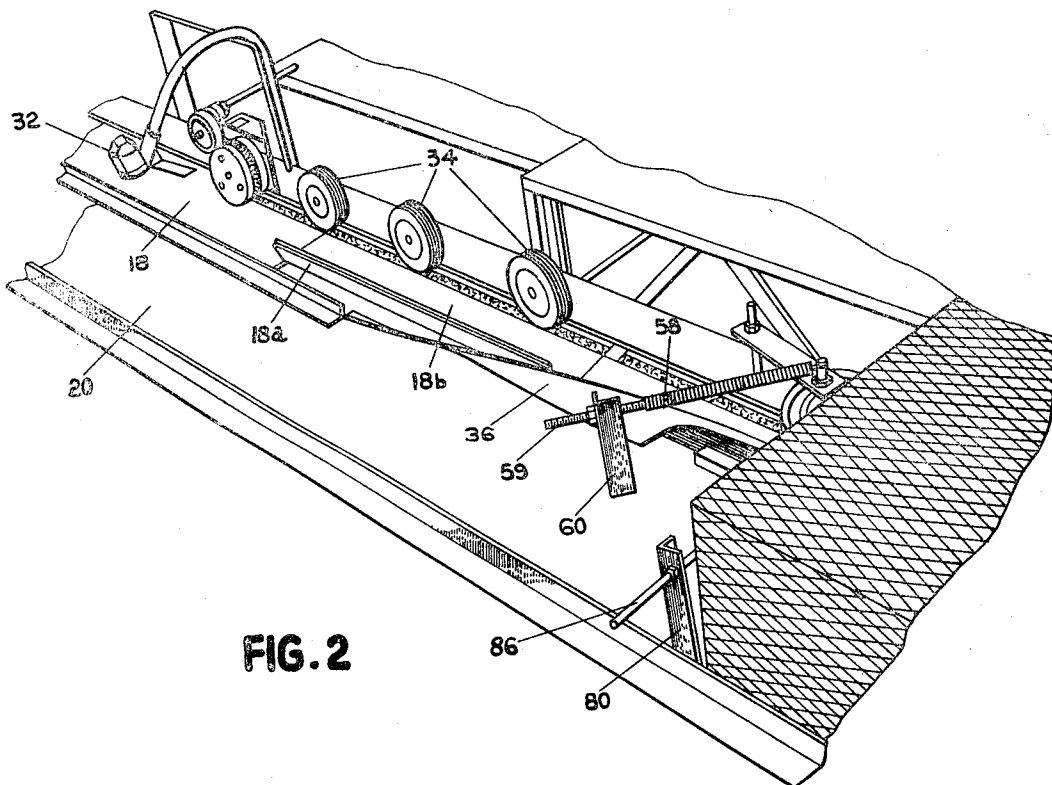


FIG. 2

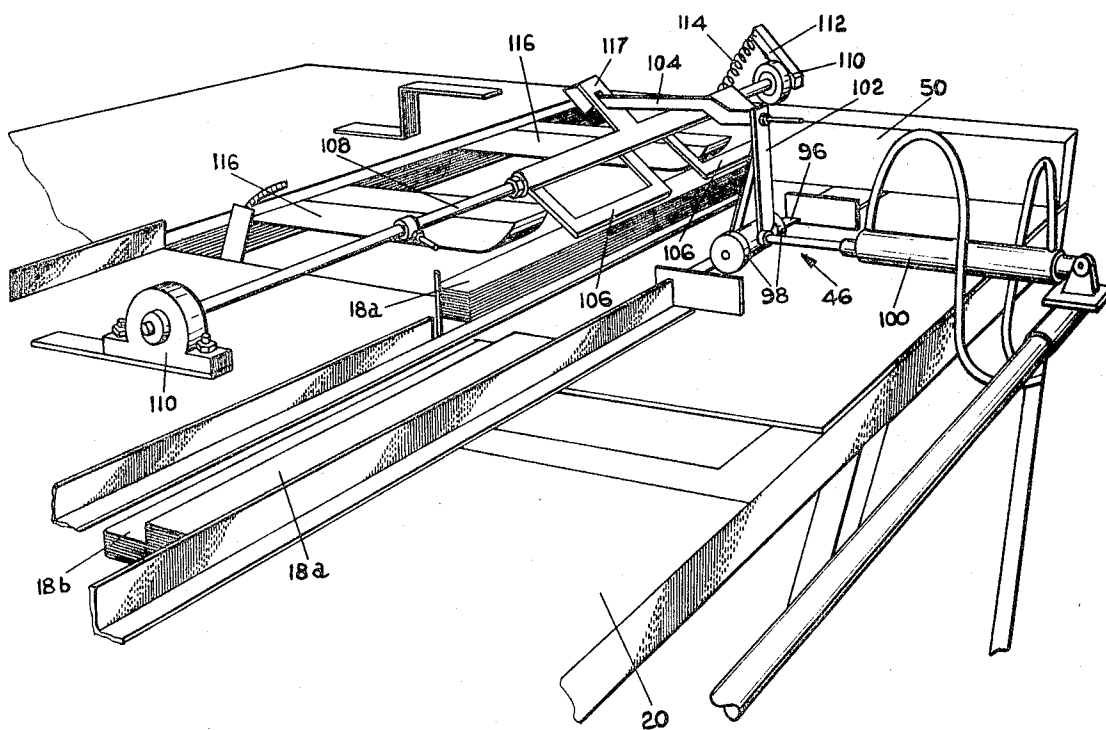


FIG. 5

CORNER BLOCK FORMING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

In my copending U.S. patent application Ser. No. 152,226 filed June 11, 1971, there is disclosed and claimed a corner post construction and method of forming the same. The corner post is an L-shaped block formed by placing an elongated groove through a multiple-ply board or sheet of material, leaving a hinge between two unequal portions of the board, placing glue on the uncut surface and folding the board portions about the hinge to form the L-shaped corner post. The corner post or block has a portion thereof sprayed with a wax emulsion coating to protect products from the abrasive nature of the cut edges of the post. The thus formed post has great strength compared to conventional corner posts, is not abrasive, and is relatively inexpensive to manufacture.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a block forming apparatus. In one of its aspects, the invention relates to an apparatus for forming L-shaped corner blocks from multiple-ply corrugated boards and the like.

2. State of the Prior Art

In the manufacture of corner blocks, it is known to slit score a sheet of corrugated board a number of times, fold the sheet a plurality of times about the slits and glue the folded sheets together to form an L-shaped block.

STATEMENT OF INVENTION

According to the invention, an apparatus for making corner posts or packaging blocks from multiple-ply boards of substantially uniform thickness has a cutting means set to cut a groove in all but one ply of the boards, leaving a hinge between two unequal portions thereof. Means are provided for feeding the boards seriatim to the cutting means and means are provided for applying glue to the uncut surface of the boards near the area of the groove. Means fold the cut and glued portions of the board about the hinge thereby making an L-shaped block. Means apply a wax coating to at least one surface of the L-shaped block. Preferably, the feeding means includes a hopper for dispensing the boards seriatim from a stack, means for picking off an end board from the stack and means for moving the end board to said cutting means responsive to the absence of a board at the cutting means.

Squaring means are provided to align the cut edges of the folding block in a common plane prior to setting of the glue. The squaring means comprise a guide means positioned to abut the cut edges of the folded block and means engaging the opposite side of the folded block for forcing the cut edges against the squaring means guide means prior to setting of the glue. Preferably, means simultaneously press the two portions of the board together during operation of the squaring means to firmly set the two portions in the proper relationship.

Further, means sense the presence of a folded block at the wax applying means and means stop the flow of wax through the wax applying means responsive to the absence of a board at the wax applying means.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a schematic side elevational view of an apparatus according to the invention;

FIG. 2 is a perspective view of the folding mechanism according to the invention;

FIG. 3 is a plan view of a portion of the apparatus illustrating the squaring mechanism;

FIG. 4 is a schematic illustration of the wax spray control means seen along lines 4—4 of FIG. 3; and

FIG. 5 is a perspective view of the length cutting portion of the apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is illustrated a hopper 12 having a pair of side walls 14 and 16 for containing a vertical stack of multiple-ply corrugated board 18. A table 20 is positioned beneath the stack 18 for supporting the corrugated boards 18. The side walls 14 and 16 leave a gap between the bottom portions thereof and the table 20 for removal of the bottom-most board in the stack.

A picker arm 22 is positioned at the bottom of the stack for engagement with the bottom-most board in the stack. The picker arm 22 is attached to the end of a piston rod which is actuated for reciprocal movement by a pneumatic cylinder 24.

As illustrated in FIG. 1, a photoelectric sensing means 120 is positioned at the side of the side wall 14 for viewing the corrugated board 18 passing from beneath the side wall 14. The photoelectric sensing means 120 is coupled to the control valve for the hydraulic cylinder 24 to actuate the cylinder to move the picker arm 20 to the right as viewed in FIG. 1 in the absence of a corrugated board 18 adjacent the side wall 14. Thus, after the picker arm 22 has moved the corrugated board 18 beneath the drive wheel 26, it retracts and stays retracted until the end of the board passes from view of the photoelectric sensing means.

Drive rollers 26 and 28 grip the corrugated board 18 and pull the board through a saw blade 30. The corrugated board 18 has an elongated groove formed therein by the saw blade 30, the groove dividing the board 18 into a short side portion 18a and a wide side portion 18b. The saw blade 30 is set up to cut through all but the top ply of the board 18, thereby leaving a hinge between the short side 18a and the wide side 18b.

Glue is applied to the top of the short side portion 18a by a glue dispenser 32. The board passes beneath idler rollers 34 and through a folding means comprising a folding guide 36. The short side portion 18a is raised by the folding guide 36 and flipped over onto the top of the wide side portion 18b, thereby forming an L-shaped block. Pairs of guide rollers 38, 40, and 41 square the thus formed block so that the cut edges of the short side portion 18a and the wide side portion 18b are aligned in a common plane. The squared block then passes beneath compressing rollers 42 and beneath a wax spraying head 44 at which a wax emulsion coating is applied to the top surface of the block. The coated block is then pushed against stop 50 and a lateral pushing means 46 pushes the blocks laterally through saw blades 48 to sever the blocks into smaller lengths.

The squaring mechanism for the blocks is illustrated in FIG. 3. A hold down wheel 52 is pivotably mounted on a supporting link 54 to engage the inner edge of the short side 18a. Link 54 is pivotably mounted on a shaft 56 which is secured to the table 20. A spring 58, secured to the free end of the link 54 and to threaded rod 59, biases the wheel 52 against the edge of the short side 18a. The threaded rod 59 is adjustably secured by nuts to a bracket 60 which is fixed to the table 20. Each of the squaring rollers 38 is rotatably mounted on a slidable mounting plate 66. As seen in FIG. 1, three of the squaring rollers 38 are provided for engagement with the short side portion 18a and three of the squaring rollers 38 are provided for engagement with the wide side 18b. The mounting plate 66 has an upright bracket 68. A threaded rod 70 is secured at one end to the bracket 68 and at the other ends to a bracket 72. Nuts threadably engage the threaded rod 70 and fix the rod within the bracket 72.

The squaring rollers 40 are mounted for rotation on a mounting plate 74 for engagement with the inside edge of the short side portion 18a. The squaring rollers 40 are mounted above the wide side portion 18b. A pivotable link 76 is rotatably supported on a mounting shaft 78 and supports at its outer end the mounting plate 74.

The squaring rollers 41 are mounted for rotation within a mounting plate 80 which is also pivotably mounted on the mounting shaft 78. An adjustable link 82 connects the mounting plate 80 with the pivotable link 76. The squaring rollers 41 are mounted for engagement with the edge of the wide side portion 18b.

A tension spring 84 is secured at one end to the pivotable link 76 and at the other end to a threaded rod 86 to resiliently bias the squaring rollers 40 and the squaring rollers 41 against the sides of the block formed by the short side portion 18a and the wide side portion 18b. The threaded rod 86 extends through a bracket 88 and is fixed with respect thereto by nuts 90. The bracket 88 is secured to the table 20.

Reference is now made to FIGS. 3 and 4 for a discussion of the control for the wax supply to the wax spraying head 44. Rollers 42 are rotatably mounted on supporting links 43 to contact the top of the block. Mounting brackets 43a pivotably mount the supporting links 54. A tension spring 45 is connected at one end to the free end of the supporting link 43 and at the other end to the table 20. A microswitch 63 having an actuator 64 is positioned for contact by one of the supporting links 43 upon further clockwise rotation of the supporting links 43 about the pivotable mounting. The microswitch 63 is electrically connected to a valve 94 in the wax line 92 which supplies wax to the wax spraying head 44.

Normally, the rollers 42 engage the top of the block and the wax flows continuously through the line 92. In the event that, for some reason, there is a stoppage of corrugated board passing through the machine, the rollers 42 will move downwardly with the supporting links 43 rotating in a clockwise direction about their pivotable mountings, thereby depressing the actuator 64 of microswitch 63. The microswitch 63 then signals the valve 94 to close, thereby shutting off the flow of wax to the wax spraying head 44.

Reference is now made to FIG. 5 for a more detailed discussion of the lateral pushing means 46. A pusher plate 96 is supported on wheels 98 and is actuated for

reciprocal movement by a hydraulic cylinder 100 through a piston rod. An upright bracket 102 extends from the pusher plate and is connected at an upper portion to an actuator member 104. A pair of retainer plates 106 are pivotably mounted on a rod 108 which in turn are supported on bearings 110. A link 112 is rigidly connected at one end to the rod 108 and at the other end to a tension spring 114 to bias the rod 108 in a counter clockwise direction. A plate 117 is fixed to the rod 108 and engages the actuator member 104. Hold down members 116 retain the blocks in flat condition as they are pushed through the saw blades 48. A photoelectric sensing means 118 is positioned near the stop means 50.

The lateral pushing means operates as follows: As the finished block is moved to the stop means 50, the presence of the block is sensed by the photoelectric sensing means 118. A signal is then sent to the hydraulic cylinder 100 to push the block to the left as illustrated in FIG. 5 to push the block toward the saw blades 48. It should be pointed out that the saw blades (not shown in FIG. 5) are positioned to the left of the rod 108 so that the finished blocks are free to move toward the stop member without interference from the saw blades 48. As the pusher plate 96 is moved to the left as illustrated in FIG. 5, the actuator member 104 will also move to the left. The rod 108, following the actuator member 104, rotates in a counter clockwise direction to raise the retainer plates 106 thereby permitting the blocks to be pushed therebeneath. After the blocks have been pushed beneath the plates 106, the hydraulic cylinder 100 withdraws the pusher plate 96 to allow movement of other blocks toward the stop member 50. Upon movement of the pusher plate back towards the right as viewed in FIG. 5, the actuator member 104 will move to the right. Simultaneously therewith, the rod, following the actuator member 104 through the plate 117 will rotate in a clockwise direction thereby forcing the retainer plates 116 against the edge of the block to hold the blocks in place.

The block forming apparatus described above provides an efficient means for accurately making L-shaped blocks. A minimum of operations is required to complete the blocks. The photoelectric sensing means ensure that the corrugated boards are fed to the cutting means only as needed to prevent jamming of the production line. Further, the squaring means accurately align the portions of the block so that each of the blocks is of substantially equal size and shape. The block sensing means at the wax applying means prevents wax buildup in the event that is no block being fed beneath the wax applying means.

The wax spraying head 44 has been conveniently illustrated as positioned above the table 20 to spray the tops of the blocks. However, the spraying head can be mounted beneath the table 20 with appropriate openings in the table 20 to spray the underside of the block. Still further, the wax spraying head can be mounted at the sides of the table for spraying the sides of the blocks. Other variations and modifications are possible without departing from the scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. An apparatus for making L-shaped blocks from multiple-ply boards of substantially uniform thickness, said apparatus comprising:

cutting means set to cut a groove in all but one ply of said boards, leaving a hinge in said one ply separating two unequal portions of said board; means for feeding said boards seriatim to said cutting means;

means for applying glue to the uncut surface of said boards near the area of said groove as said boards pass from said cutting means;

means for folding said cut and glue-containing boards about said hinge, thereby making an L-shaped block;

means for applying a wax coating to at least one surface of said L-shaped block; and

means for feeding said folded boards to said wax coating means.

2. An apparatus according to claim 1 wherein said feeding means for said cutting means includes a hopper for dispensing said boards seriatim from a stack; means for picking off the end board of said stack and for moving said end board to said cutting means.

3. An apparatus according to claim 2 and further comprising means to sense the absence of a board at said cutting means; and means to actuate said pick off means responsive to the absence of a board at said cutting means.

4. An apparatus according to claim 3 wherein said cutting means further includes drive rollers to drive said boards through said cutting means.

5. An apparatus according to claim 1 and further comprising means to force glued and folded portions of said board into contact with each other to set the glue on said board portions.

6. An apparatus according to claim 1 and further comprising squaring means to align the cut edges of said folded block to be coplanar prior to setting of said glue.

7. An apparatus according to claim 6 wherein said squaring means includes a guide member positioned to abut said cut edges of said folded block, and means engaging a side of said folded block opposite said cut edges for forcing said cut edges against said squaring means guide member.

8. An apparatus according to claim 7 wherein said block engaging and forcing means includes a roller resiliently biased toward said squaring means guide means.

9. An apparatus according to claim 1 and further comprising means to sense the presence of a folded block at said wax applying means, and means to shut off

the flow of wax to said wax applying means in the absence of a folded block at said wax applying means.

10. An apparatus according to claim 1 and further including means for cutting said blocks into shorter lengths; and means for passing said wax coated blocks to said length cutting means from said wax applying means.

11. An apparatus according to claim 10 wherein said length cutting means includes at least one saw disposed transverse to the length of said folded blocks; an end stop for said folded blocks to limit the movement of said blocks; means to move said blocks so that an end thereof is in contact with said stop means; and means to move said block laterally of said end stop to said length cutting saw responsive to said block end contacting said stop means.

12. An apparatus according to claim 11 wherein said lateral moving means further includes means for sensing the presence of said block at said stop means.

13. An apparatus according to claim 11 and further including gate means to retain said blocks in displaced lateral position after movement by said lateral moving means.

14. An apparatus for making an L-shaped corner post from a multiple-ply board of substantially uniform thickness throughout, said apparatus comprising:

means for cutting a groove through all but one ply of said multiple-ply board;

said groove extending longitudinally of said board and dividing said board into two unequal portions with a hinge therebetween;

means for applying glue to the uncut surface of said board near the area of said groove as said board passes from said cutting means;

means for folding said unequal portions of said board about said hinge to form an L-shaped corner post; and

means for aligning said cut portions of each of said unequal portions into a common plane for precise alignment of said block prior to setting of said glue.

15. An apparatus according to claim 14 wherein said aligning means includes a guide member positioned to abut said cut edges and means resiliently forcing said cut edges of said block against said guide member; and means for forcing said glued portions of said blocks together while said block is forced against said guide member.

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