Sept. 25, 1934. A. J. AMBROSE 1,974,636

MACHINE FOR MAKING BOX TOPS AND BOTTOMS

Filed Oct. 24, 1932 5 Sheets-Sheet 1

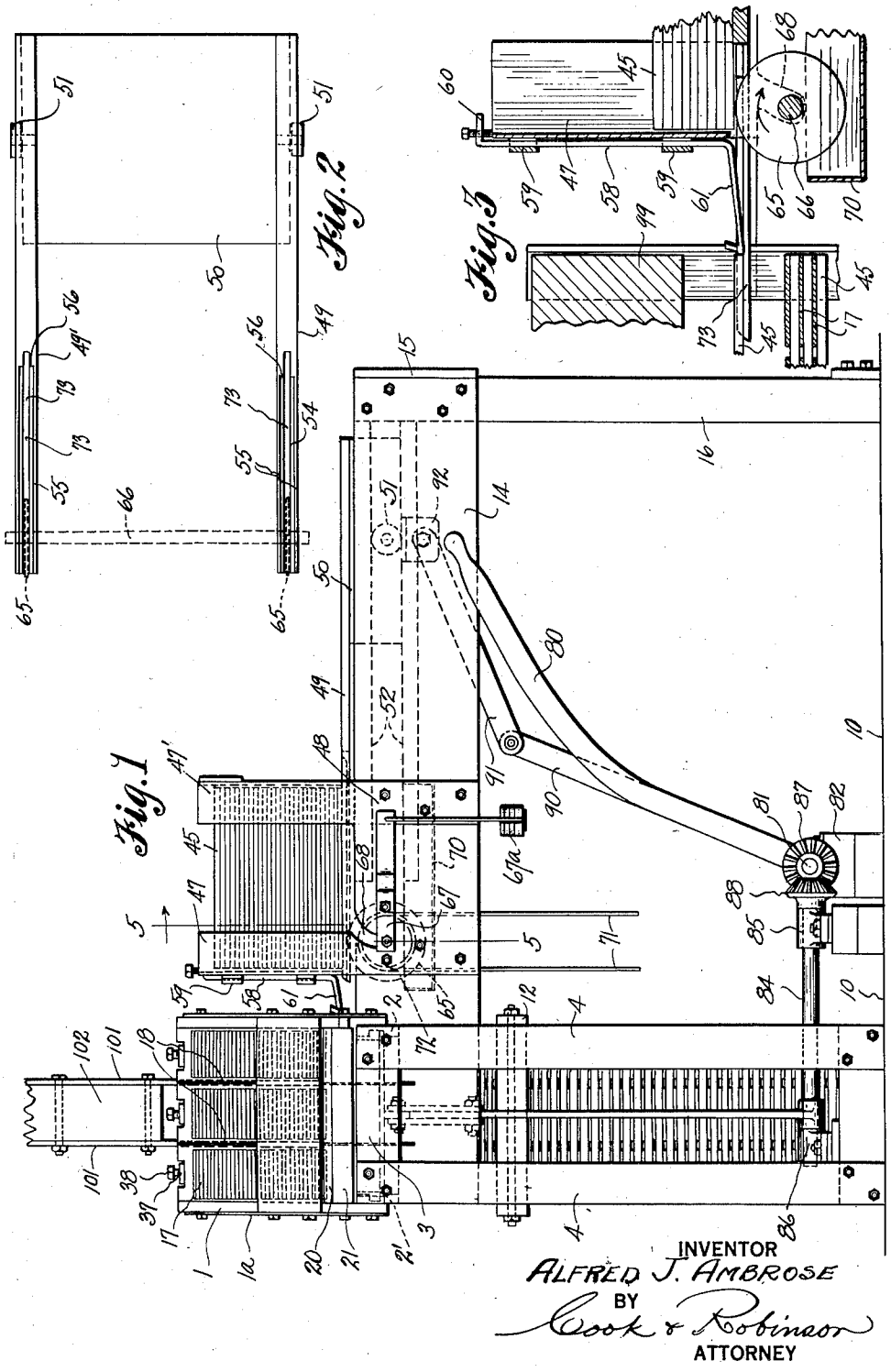


Fig. 1

Fig. 2

Fig. 3

INVENTOR
ALFRED J. AMBROSE
BY
Cook & Robinson
ATTORNEY

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Fig. 5

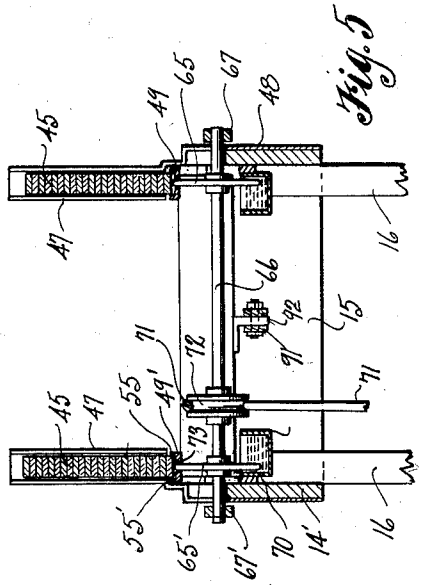
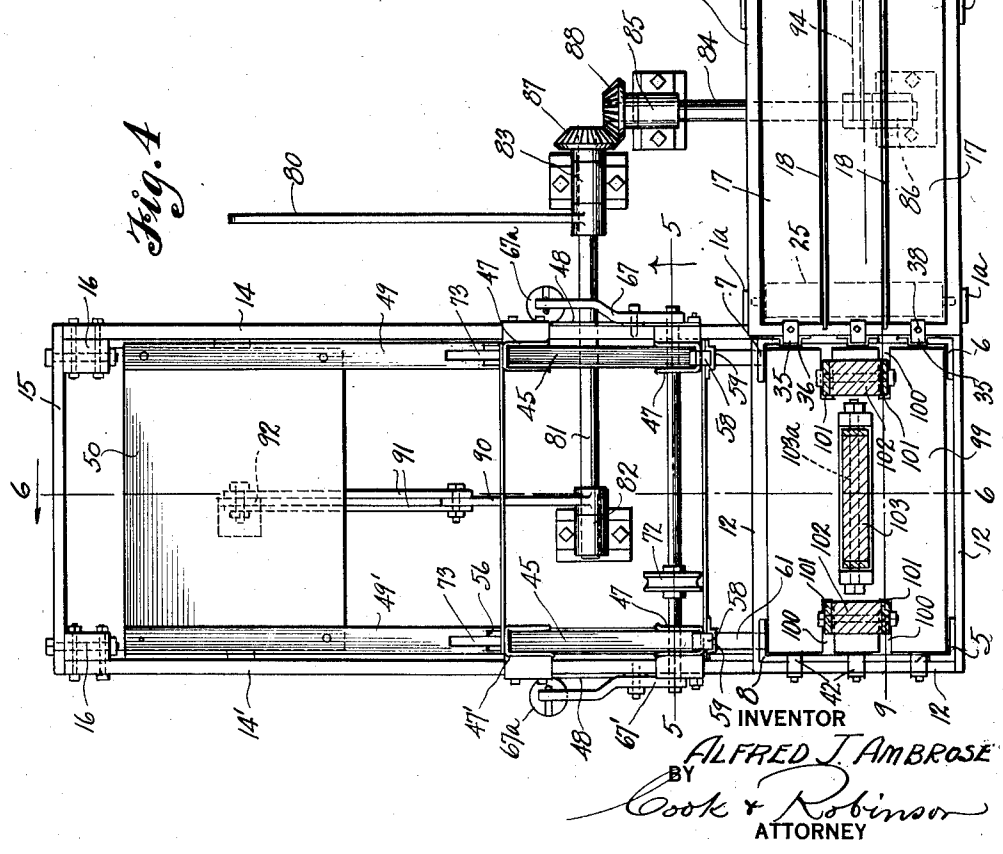


Fig. 4



INVENTOR
ALFRED J. AMBROSE
BY
Cook & Robinson
ATTORNEY

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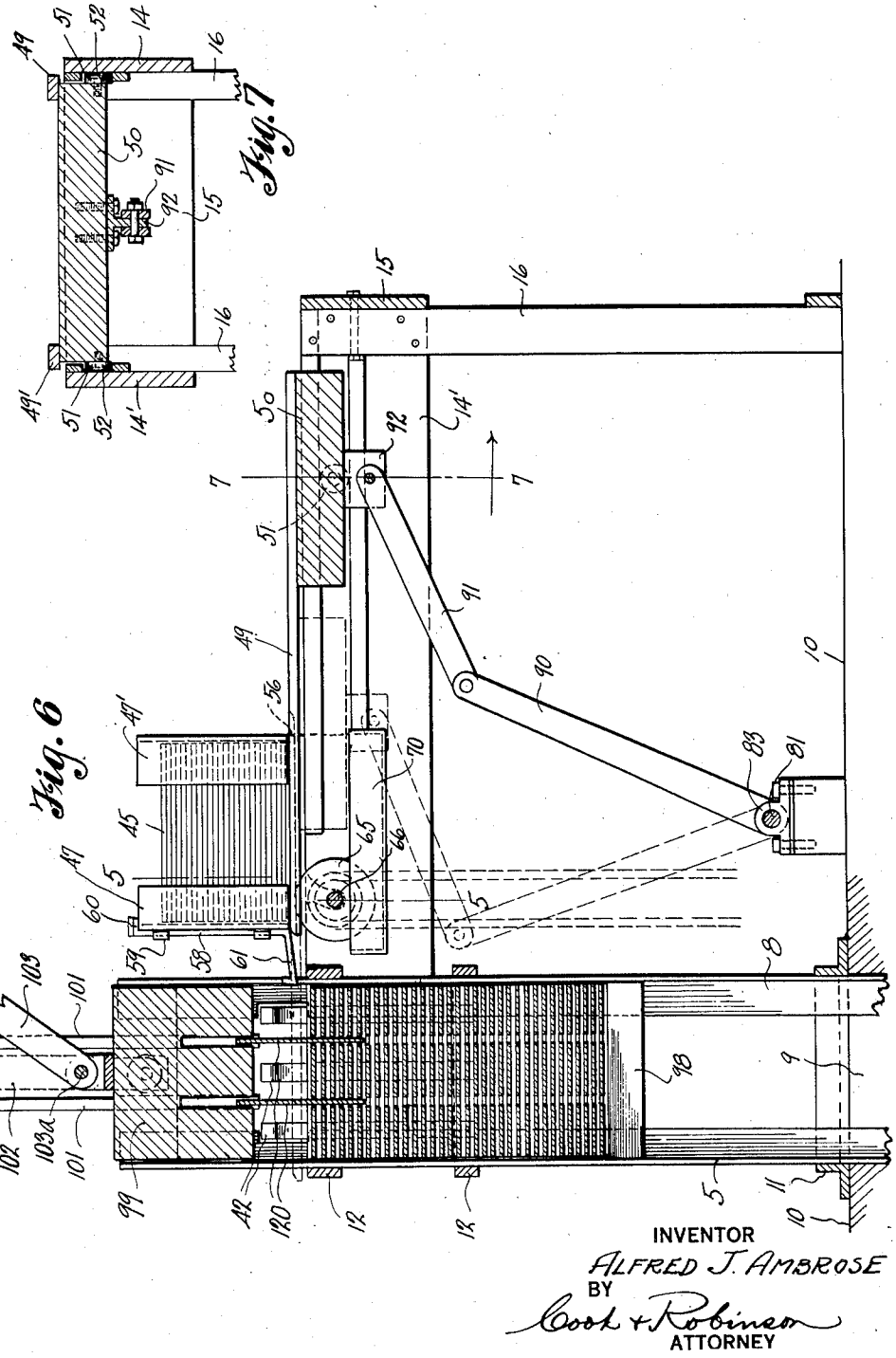


Fig. 7

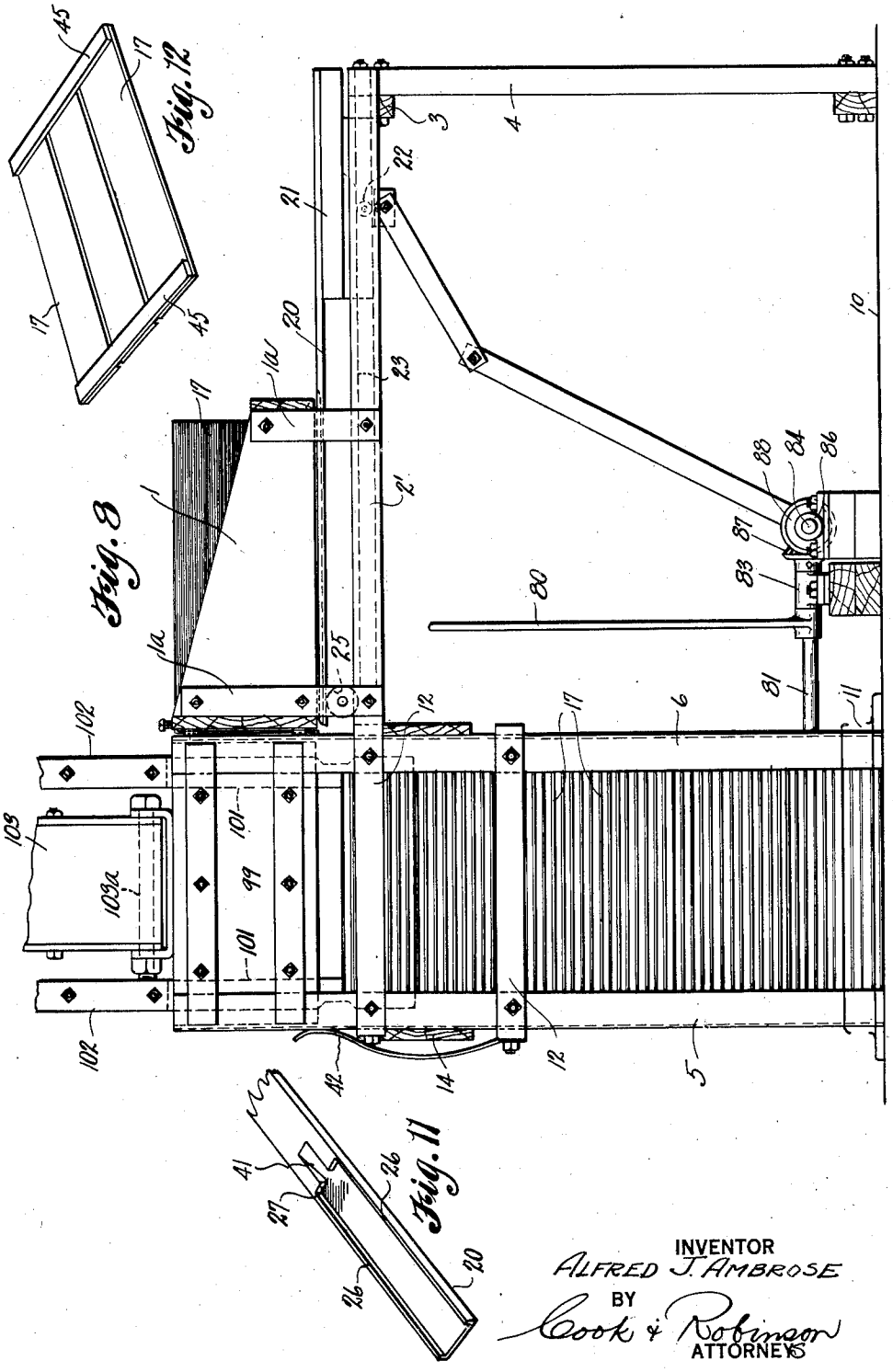
Fig. 6

INVENTOR
ALFRED J. AMBROSE
BY
Cook & Robinson
ATTORNEY

Sept. 25, 1934. A. J. AMBROSE 1,974,636

MACHINE FOR MAKING BOX TOPS AND BOTTOMS

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INVENTOR
ALFRED J. AMBROSE
BY
Cook & Robinson
ATTORNEYS

Sept. 25, 1934. A. J. AMBROSE 1,974,636

MACHINE FOR MAKING BOX TOPS AND BOTTOMS

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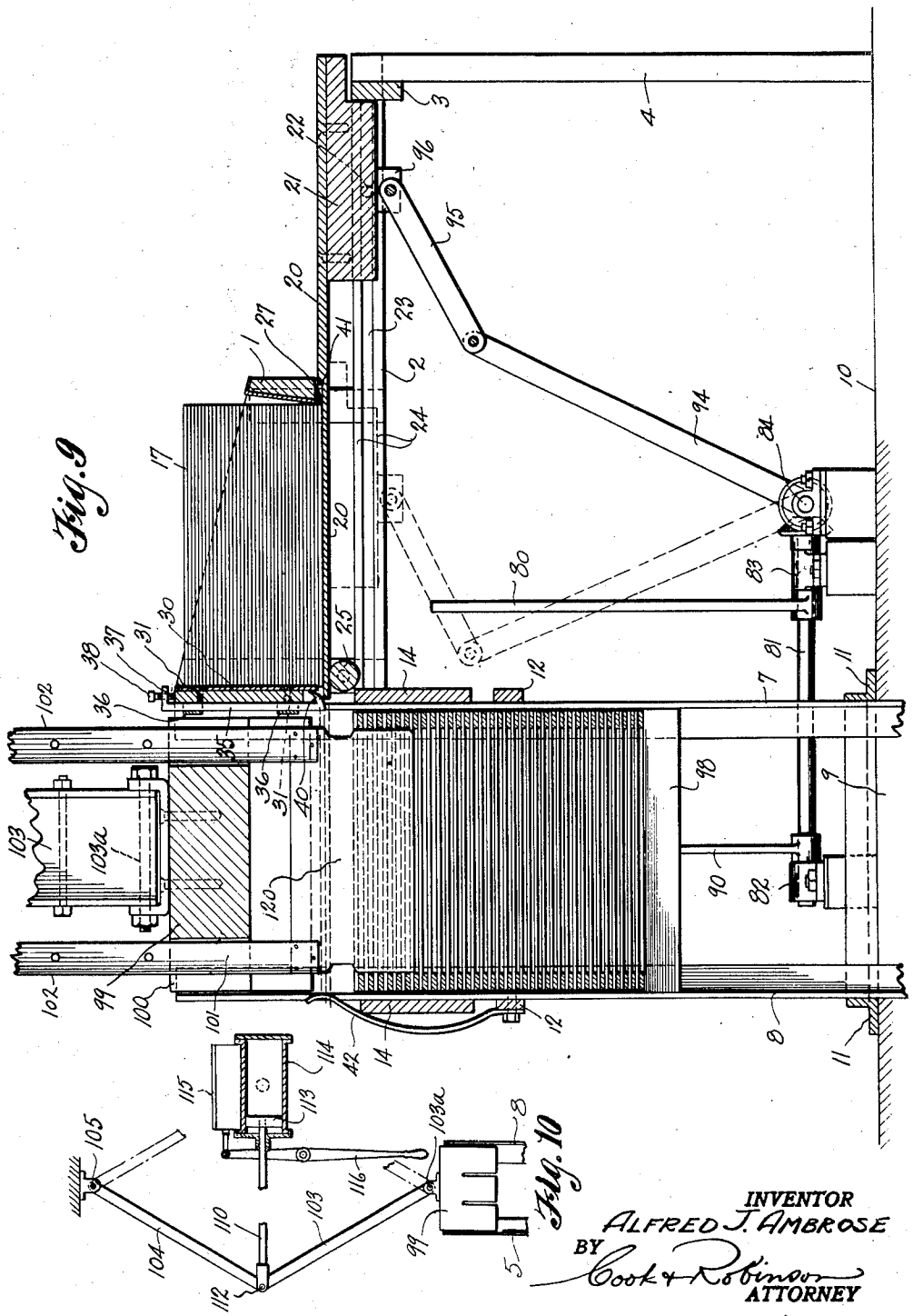


Fig. 9

Fig. 10

INVENTOR
ALFRED J. AMBROSE
BY Cook & Robinson
ATTORNEY

Patented Sept. 25, 1934

1,974,636

UNITED STATES PATENT OFFICE

1,974,636

MACHINE FOR MAKING BOX TOPS AND BOTTOMS

Alfred J. Ambrose, Yakima, Wash., assignor to The Cascade Lumber Company, a corporation

Application October 24, 1932, Serial No. 639,184

9 Claims. (Cl. 144—7)

This invention relates to a machine for making tops and bottoms for wooden boxes such as are used for the crating of apples, peaches, berries, or the like; and which are made up of a plurality of thin boards arranged side by side, slightly spaced and joined together across their ends by narrow cleats.

The principal object of this invention is to provide a machine of the above character whereby the boards and cleats making up a top or bottom may be mechanically assembled in a practical, economical and efficient manner, at a relatively small cost.

Another object of the invention is to provide a machine designed for the manufacture of box tops and bottoms of the above character including means by which the cleats will be glued to the boards in lieu of their being fastened by nails or other metallic devices.

Still another object resides in the provision of mechanism whereby a narrow strip of glue will be applied to each cleat as it is delivered into the assembling mechanism and wherein mechanism positions the cleats properly upon the boards for permanent attachment thereto by the glue.

More specifically stated, this invention resides in the provision of a machine for the above stated purpose comprising a hopper with compartments for containing a supply of boards. Also, hoppers for containing supplies of cleats; the boards and cleats being delivered from their respective hoppers into an assembling frame by the action of reciprocally moving feed slides which operate to deposit them in proper relation for permanent connection. Furthermore, provision is made in the machine for passing the cleats across glue applying rolls as they enter the assembling mechanism, and a presser block is arranged to press the assembled parts together to insure proper attachment of the cleats and boards through the medium of the glue.

Other obects of the invention reside in the various details of construction, in the combination of parts and in their mode of operation, particularly with reference to the board and cleat feed slides and the assembling mechanism as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a front elevation of the machine.

Fig. 2 is a plan view of the feed slide for the delivery of the cleats into the assembling frame.

Fig. 3 is a sectional detail of parts related to the cleat delivering and to the glue applying means; particularly illustrating the stop bar for preventing return movement of the cleat with return movement of the feed bar.

Fig. 4 is a plan view of the machine.

Fig. 5 is a cross sectional detail taken substantially on the line 5—5 in Figs. 4 and 6.

Fig. 6 is a vertical section, taken on the line 6—6 in Fig. 4, particularly illustrating the cleat feeding slide mechanism and the presser block in the assembling frame.

Fig. 7 is a vertical cross section taken on line 7—7 in Fig. 6.

Fig. 8 is a side elevation of the machine.

Fig. 9 is a vertical section taken on the line 9—9 in Fig. 4, particularly illustrating the board feeding mechanism and the assembling of boards and cleats in the presser frame.

Fig. 10 is a diagrammatic view of the presser block actuating means.

Fig. 11 is a perspective view of a portion of one of the plates of the board feeding slide.

Fig. 12 is a perspective view of one of the finished box sections.

Referring more in detail to the drawings—

The frame structure of this machine, in plan view, is of right angular form as seen in Fig. 4, with the board and cleat assembling frame located at the vertex and the hoppers and their corresponding feed slides for the boards and cleats, respectively, contained within the two wings of the frame.

The supporting frame for the hopper 1 in which the flat boards for the box sections are contained comprises horizontally mounted, parallel, opposite side rails 2—2'. These are supported at their inner ends from the assembling frame structure, presently described, and are connected at their outer ends by a cross bar 3; this end being supported by legs 4.

The assembling frame is made up of four vertically arranged angle iron beams 5, 6, 7 and 8, as seen best in Fig. 4. These beams define the corners of a vertical, open guideway within which the boards and cleats are assembled and placed under compression to insure their proper connection. These angle beams, as seen in Figs. 6 and 9, pass through an opening 9 in the floor 10 on which the machine is mounted and they are held rigidly in place by angle iron cleats 11 attached thereto and to the floor about the opening. Also, there are plates 12 connecting the beams at required intervals to hold the guideway in proper shape and in required size to maintain a desired friction on their unitized parts advanced therethrough as presently described.

The frame for the cleat feed slide and for the support of the glue applying apparatus and cleat containing hoppers comprises parallel opposite side beams 14—14' attached rigidly at their inner ends to the assembling frame and joined at their outer ends by a cross bar 15 to which supporting legs 16 are attached.

The box section, either top or bottom, which the present machine makes, is composed of three thin boards 17, as shown in Fig. 12. These boards, before assembly, are arranged in the hopper 1. The hopper is of rectangular form and is mounted upon the frame beams 2 and 2' close to the assembling frame by straps 1a, and it is longitudinally divided by two partitions 18 into three compartments of like size, and each adapted to contain a stack of boards therein; the compartments being open at their lower ends.

The feed slide whereby the boards are fed into the assembling frame comprises three horizontally disposed plates 20 attached at their outer ends to a block 21 that is supported for reciprocal action between the frame beams 2 and 2' by rollers 22 at its opposite sides, movable within guideways 23 formed between spaced ribs 24 fixed longitudinally to the inner sides of the beams. At their inner ends the three plates rest upon a transverse roller 25 which is mounted across the inner end of the frame structure below the hopper end adjacent the assembling frame, as seen in Fig. 9. This roller, together with the rollers 22 movable in the guides 23, support the feed slide for free reciprocal action.

All of the plates 20 are of like size and are evenly arranged. The inner end portions of the plates are adapted, when the slide is at its outer limit of travel as seen in Fig. 9, each to underlie and support a stack of boards in the hopper 1. Each plate is longitudinally recessed in the top surface of its inner end portion, as shown in Fig. 11, to provide narrow retaining ribs 26 at its opposite side edges between which a board may be received, and the inner end of the recess opens directly to the end of the plate, while at its other end it has a vertical shoulder 27 adapted to engage against the end of the board resting therein when the slide moves inwardly, thereby to cause the board to be pushed from the lower end of its stack in the hopper into the assembling frame.

The arrangement of the feed slide is such that when it is actuated to its outer position, as seen in full lines in Fig. 9, the three plates are properly positioned to receive the lowermost boards of the supply stacks within their recessed end portions. Then, as the slide advances inwardly, to the dotted line position of Fig. 9, the lowermost board of each stack is pushed from the hopper and the supporting plate carries it into the assembling frame. Gauge plates 30 are adjustably fixed by screws 31 to the inner end wall of the hopper, as seen in Fig. 9, with their lower end portions definitely spaced from the slide plates 20 to permit each plate to advance but one board at a time from the hopper.

When the feed slide moves outwardly from the dotted line position of Fig. 9, the boards which have been advanced on the plates are retained against return movement, each by a stop bar 35 as seen in Figs. 9 and 4. Each of these three stop bars is slidably supported in guides 36 for limited vertical movement. At its upper end each bar has a laterally directed portion 37 overlying the end wall of the hopper. The portion 37 has a vertical bolt 38 threaded therethrough to engage the top edge of the hopper wall, and the bolt is adjustable to accurately limit the downward movement of the stop bar. At their lower ends, the bars 35 have inwardly and upwardly curved tongues 40 acting as runners beneath which the boards are advanced by the slides. As the slide moves inwardly, the runners of the stop bars merely ride upon the advancing boards and finally the bars drop into plate recesses 41 contained back of the inner ends of the board and shoulders 27. Then as the slide moves outwardly, the stops 35 at their lower ends squarely engage the ends of the boards and hold them against return movement. Thus, the three boards, moved into the assembling frame, will be pushed from the feed slide plates 20 and dropped into the frame in proper relation for their being assembled with the cleats. As the slide plates 20 move into the assembling frame, they advance the boards slightly beyond the stops, then to insure that they will be returned against the stops and will be evenly delivered into the assembling frame, I have provided the leaf springs 42 as seen in Fig. 9, which are fixed to a cross bar 12 and disposed with free ends in position to engage the ends of the boards as the feed plates 20 recede. These springs push the boards inwardly and cause them to drop properly in place in the assembling frame.

The cleats 45 which are applied across the opposite ends of the boards to complete the box bottom or top, are arranged horizontally in two supply stacks, as seen in Fig. 4. These stacks extend in the longitudinal direction of the frame beams 14—14' and are spaced apart the same distance they assume in the finished product. Each stack is contained at its ends in hopper guideways 47—47' which are formed integral with plates 48 bolted to opposite sides of the frame. These guideways are open at their lower ends, as seen in Fig. 5, and the two stacks of cleats that are supported in the paired guideways rest, respectively, upon feed bars 49—49' extended parallel to each other and in the direction of the cleats, and which are fixed on a feed block 50 reciprocally movable in the frame toward and from the assembling frame.

As seen in Figs. 6 and 7, the block 50 has supporting rollers 51 at opposite sides contained in horizontal guideways 52 provided in the inner faces of the frame side members 14 and 14'. The two feed bars 49—49' of this feed device are recessed along their outer end portions in a manner similar to the plates of the first described feed device. Each has a longitudinal depression 54 opening to the end thereof defined by opposite side ribs 55—55' between which a cleat 45 is adapted to be contained. The recesses have inner end shoulders 56 for engaging the contained cleats to advance them from the hoppers when the slide moves inwardly; this being permitted by reason of termination of the hopper side wall slightly above the level of the lowermost cleat, as seen in Fig. 3.

When the cleat feed slide 50 is at its outer position of adjustment, as seen in Fig. 6, the recessed ends of the two bars 49—49' are disposed directly beneath the two stacks of cleats and the lowermost cleat of each stack rests within a bar recess. Then, as the slide moves inwardly, to the dotted line position in Fig. 6, the two contained cleats are carried on the bars into the assembling frame.

Stop bars 58, substantially like those used in connection with the feeding of boards into the

machine, are employed in connection with the hoppers 47. These bars 58, as seen in Figs. 3, 4 and 6, are vertically slidable in guides 59 attached to the guide hoppers 47 and they have inwardly directed upper ends 60 to limit downward movement by contact with the upper ends of the hoppers, and they have inwardly and downwardly directed lower end stop portions 61 beneath which the cleats are pushed on entering the assembling frame. These stop portions 61 ride upon the cleats as they enter, then drop back of their outer ends when the slide reaches its limit of travel and thus prevent the cleats returning with the feed bars.

For the purpose of applying strips of liquid glue to the cleats as they are delivered into the assembling frame, I provide a pair of glue applying rolls 65—65′ keyed on a revolubly mounted cross shaft 66 supported at its opposite ends in the ends of supporting levers 67—67′ pivotally attached to the opposite side beams of the frame as seen in Figs. 1 and 4. Weights 67*a* are suspended from these levers in a manner to cause the shaft and rolls to be urged upwardly. The side frames and plates 48 are cut away, as seen at 68 in Fig. 1, to provide for unobstructed upward or downward movement of the cross shaft.

Each of these glue applying rolls 65—65′ is disposed with its lower portion in a glue containing pan 70; these pans being supported from the frame structure in any suitable manner. The cross shaft 66 is rotatably driven in the direction of the arrow thereon in Fig. 3, by a pulley belt 71 operating over a pulley wheel 72 on the shaft, for the application of glue to the cleats as they are moved into the assembling mechanism. To permit of this application of glue, the feed bears 49—49′ on which the cleats rest are longitudinally slotted throughout and somewhat beyond their recessed portions, as shown at 73 in Figs. 2, 3 and 5. The rolls are so positioned as to bear against the under sides of the cleats as they are moved into the assembling frame, and the rotation of the rolls causes the glue to be transferred by the rolls to the cleats. These rolls are quite narrow, as seen in Fig. 5, and thus only a narrow ribbon of glue is applied to each cleat along the longitudinal center of its under surface.

In the present arrangement, the feed slide 21 for the boards and the slide 50 for the cleats operate inwardly and outwardly together. Thus it is necessary that they be in different horizontal planes to prevent any possible interference or entrance to the assembling mechanism. In the present instance, the slide bars 49—49′ for the cleats are disposed in the lower plane and with each inward reciprocal action of the two slides, a set of boards are placed in the frame upon a set of cleats. The cleats, however, by reason of the glue being applied to their under surfaces, are attached to the boards delivered by the preceding action.

The means provided for actuating the feed slides comprises a hand lever 80 attached at its lower end to a revolubly mounted shaft 81 extended transversely beneath the frame of the cleat mounting and feeding mechanism. This shaft is revolubly supported in bearings 82 and 83. There also is a cross shaft 84 extending transversely beneath the board hopper and feed slide supporting frame and this is revolubly mounted in bearings 85 and 86. Miter gears 87 and 88, of like size, are applied in mesh to these two shafts so that rotative action of the first shaft by the lever 80 will transmit a like movement to the shaft 84.

Fixed to shaft 81 is a lever 90 connected at its upper end by a link 91 with a bracket 92 on the feed slide block 50. Likewise, there is a lever 94 fixed to shaft 84 and connected at its upper end by a link 95 with a bracket 96 on the block 21 of the board feed slide. Thus, by an oscillatory action of the lever 80 between the full line position to the dotted line position of Fig. 1, the two feed slides will be simultaneously actuated one to deliver a set of cleats into the assembling frame and the other to deliver a set of boards onto the cleats.

At the start of an assembling operation, a base block 98 is fitted within the angular members of the presser frame just beneath the point of entrance of the cleat delivering feed bars. This block is friction tight within the guideway and as the cleats and boards for the box sections are successively delivered by action of the feed slides into the guideway, a presser block 99, moving reciprocally against them within the upper portion of the guideway causes them to be advanced downwardly. The base block 98 is fitted sufficiently tight within the guideway that considerable pressure is required to force it downwardly, thus, under the action of the presser block 99 the boards and cleats will be pressed firmly together so that the glue will have the desired action. This block is only necessary for the first charging of the chute as thereafter the unitized parts themselves maintain the required friction against the chute.

The presser block, or head, 99 is reciprocally contained within the upper end of the guideway provided within the angle bars 5, 6, 7 and 8. It is also slotted at opposite edges, as at 100, to receive therein the vertical guide bars 101 that depend upon a pair of rigid beams 102, which, as later described, support spacers whereby the boards are held in proper relation after entering the assembling frame. Reciprocal action of the presser block 99 may be effected in any suitable manner. In Fig. 10 it is shown as attached by a pair of toggle links 103 and 104 to a fixed pivot 105 directly above the block; the links being pivotally connected together and the link 103 being pivotally attached by a bolt 103*a* to the block 99.

When the toggle mechanism is broken toward either side, for instance as in Fig. 10, then the presser block will be held in raised position. Then by swinging the toggle to the opposite side, the block will be actuated downwardly and then back to starting position. The downward action is such as to press the stack of boards and cleats, as assembled in the guideway, downwardly. The stack in this instance is built onto at its upper end and after each reciprocal action of the feed slides which deliver boards and cleats into the assembling frame, the presser block comes down to move the stack downwardly. By the time the assembled parts reach the lower outlet of the guideway they will have been properly glued together.

In the present instance the toggle mechanism is actuated by a piston rod 110 connected at its outer end at the point of connection 112 of the links and it is actuated by a piston 113 reciprocable in a cylinder 114 under suitable fluid pressure medium delivered to the cylinder through a valve mechanism 115 controlled by a hand lever 116. It is to be understood that the means shown for the actuation of the presser block is only

illustrative, and might consist of any other means either hand operated or power operated, either by steam, electricity or other type of engine. Therefore, it is not intended that the claims shall limit use of the device to any certain power means or to any certain kind of lever, gear or toggle mechanism. It is quite essential in the manufacture of these box tops and bottoms that they be accurately sized, that the boards be evenly spaced and the cleats be applied flush with their ends. Therefore, the angle iron corner members of the assembling frame are accurately located to form a frame of the exact dimensions of the finished box section. Then when the three boards are delivered into the guideway and the outer boards engaged with the beams, the width of the top or bottom is thereby accurately determined. The central board then is spaced evenly between the outer boards. The even spacing of the boards is accomplished by means of spacing plates 120 which are suspended vertically within the guideway from the lower ends of the vertical bars 101 seen in Figs. 6 and 9. These plates 120 retain the boards equally spaced and press the outer boards against the sides of the guideway.

The vertical end edges of these spacing plates are accurately spaced from the ends of the assembling guideway at a distance just sufficient to receive the cleats. Thus, when the feed slides 49—49′ deliver the cleats 45 into the assembling frame the cleats will be held by the plates flush with the ends of the boards and retained against inward displacement and they are held by the frame members against outward displacement.

Briefly described, the operation of the device is as follows: A supply of boards is placed in each of the compartments of the hopper 1 and cleats 45 are placed in their hoppers 47. Then the operator, by movement of lever 80, causes a reciprocal action of both feed slides to deliver a set of cleats and a set of boards into the assembling frame. Repeated operations cause the stack, composed of the alternately arranged boards and end cleats, to be built up in the guideway, but after the delivery into the guideway of each set of cleats and boards, the presser block 99 is actuated downwardly by a reciprocal movement of piston rod 110 under control of the lever 116, against them to move the stack downwardly. As each set of cleats are delivered across the rolls 65 a strip of glue is applied thereto, and thus in their assembled relation with the boards, and under the pressure of blocks 99 in pushing the stack downwardly, the boards are glued to their respective cleats. The assembled parts are removed from the lower end of the guideway frame as they are delivered thereto under the advancing action of the presser block 99.

Having thus described my invention, what I claim as new therein and desire to secure by Letters-Patent is—

1. A machine of the character described comprising an assembling frame, hoppers for containing board stacks, hoppers for containing cleat stacks, feed devices operable to advance boards and cleats from their respective hoppers into the assembling frame and to deposit them in assembled relation therein for the formation of box covers, or the like, and means for applying an adhesive to some of said parts during their delivery to effect the attachment of the cleats to their corresponding boards.

2. A machine of the character described comprising an assembling frame, a plurality of hoppers for containing board stacks arranged adjacent the frame, a plurality of hoppers for cleat stacks arranged adjacent the frame, feed slides operable, respectively, to deliver the boards and cleats from their respective hoppers in sets into the assembling frame and to deposit them alternately in stacked relation with the cleats transversely of the boards, means for applying an adhesive to the cleats during their delivery thereby to effect the joining together of corresponding board and cleat sets and means for applying pressure upon the stack of assembled parts.

3. A machine of the character described comprising an assembling frame, a plurality of hoppers for containing board stacks arranged adjacent the frame, a plurality of hoppers for cleat stacks arranged adjacent the frame, feed slides operable, respectively, to deliver the boards and cleats from their respective hoppers in sets into the assembling frame and to deposit them alternately in stacked relation with the cleats transversely of the boards, means for applying an adhesive to the cleats during their delivery, thereby to effect the joining together of corresponding board and cleat sets, means within the assembling frame and co-acting therewith for definitely spacing the boards, and for maintaining the spacing of the cleats, and means for applying pressure against the stack to aid in the joining of boards and cleats.

4. A machine of the character described comprising an assembling frame forming a guideway in which boards and cleats for box tops, or the like, may be assembled in stacked relation, a stack support fitted friction tight in the guideway, a hopper for a plurality of board stacks arranged at one side of the assembling frame, a set of hoppers for cleat stacks arranged at another side of the frame, feed slides operable, respectively, to deliver sets of boards and sets of cleats from their respective hoppers into the said assembling frame and to deposit them therein alternately and in stacked relation with the cleats transversely of the boards, glue applying rolls arranged for contact with the cleats as they are delivered to apply glue to a surface thereof whereby each set of cleats will be joined permanently to a set of boards, and a presser block operable in the guideway against the stack to advance it downwardly under pressure.

5. A machine of the character described comprising a frame structure forming a vertical guideway, rectangular in cross section and within which sets of boards and cleats for box tops, or the like, may be assembled and then retained in stacked relation, a stack support fitted friction right within the guideway, a hopper adjacent one side of the frame for containing a plurality of board stacks, a set of hoppers for cleat stacks arranged at an adjacent side of the frame, a reciprocally mounted feed slide operable for the delivery of board sets from the hopper into the assembling frame, a reciprocally mounted feed slide operable for delivery of cleat sets from their hoppers into the frame and for depositing them transversely of the ends of the boards, means for definitely spacing the boards within the assembling frame, means for alining their ends, means for applying glue to under surfaces of the cleats as they are delivered to the frame for attaching them to their corresponding set of boards, and a reciprocally movable presser block operable downwardly in the guideway against the stack of assembled parts to advance the stack downwardly under pressure and to maintain it clear of the feed devices.

6. A machine of the character described comprising an assembling frame in which parts for box tops, or the like, may be assembled, hoppers for board stacks, hoppers for cleat stacks, feed slides disposed in different horizontal planes and reciprocally operable, respectively, for delivering sets of boards and sets of cleats from their respective hoppers into the assembling frame and whereby the cleats will be deposited transversely across the board ends and the boards will be deposited parallel and in end alinement, a control lever operable to simultaneously actuate the feed slides for the delivering operation, and means for applying an adhesive to the cleats along one surface as they are delivered to effect their connection with their corresponding boards.

7. A machine of the character described comprising an assembling frame forming a vertical, open guideway of rectangular cross section, frames extending in right angular relation from adjacent sides of the assembling frame, a board containing hopper mounted by one of said latter frames, cleat mounting hoppers mounted by the other frame, feed slides reciprocally mounted by said frames to move thereon into and from the assembling frame for the delivery of sets of boards and cleats into the frame from their respective hoppers and to deposit them alternately in stacked relation with the boards parallel and evenly alined and the cleats disposed transversely across the ends thereof, mechanism operable to simultaneously reciprocate the feed slides, containers for glue in one of said frames, driven rolls mounted in the said frame and rotating in said glue containers and adapted to contact with the undersides of the cleats as they are delivered to the assembling frame, a block frictionally fitted in the guideway to support the stack thereon and a presser block reciprocally operable in the guideway against the upper end of the stack to move it downwardly under pressure.

8. In a machine of the character described, a hopper for a stack of cleats, a glue applying roll disposed beneath the hopper, a reciprocally movable feed slide whereon cleats are moved individually from the hopper; said slide being longitudinally slotted for passage of the roll to apply glue to the cleats when delivered thereacross by the slide.

9. A device as in claim 8 wherein the glue applying roll is rotatably driven opposite to direction of movement of the cleats thereon and means is provided for urging the roll against the cleat.

ALFRED J. AMBROSE.