

M. QUINLAN.
BOX MACHINE.

APPLICATION FILED APR. 11, 1911.

Patented Mar. 26, 1912.

5 SHEETS-SHEET 1.

1,021,703.

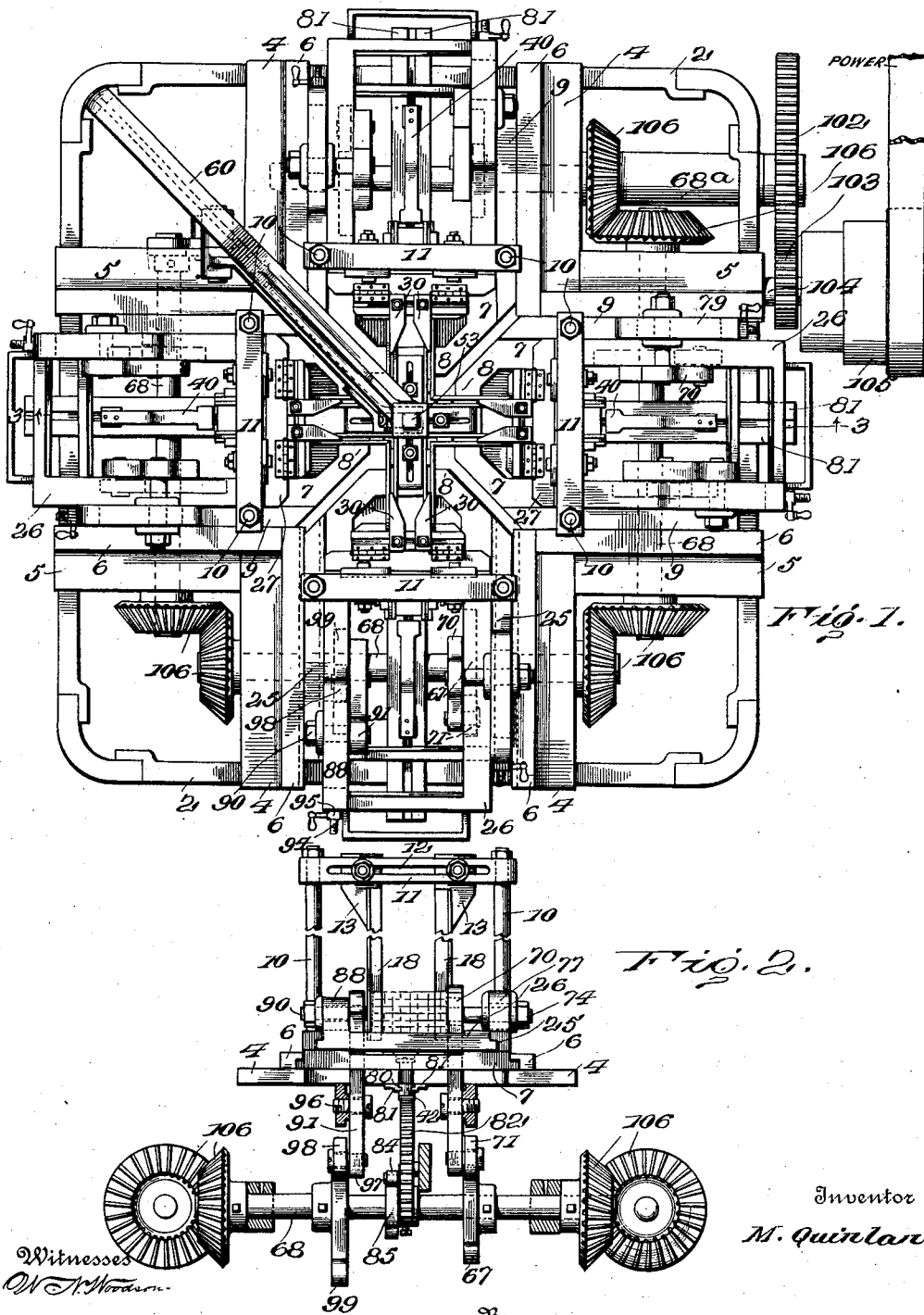


Fig. 1.

Fig. 2.

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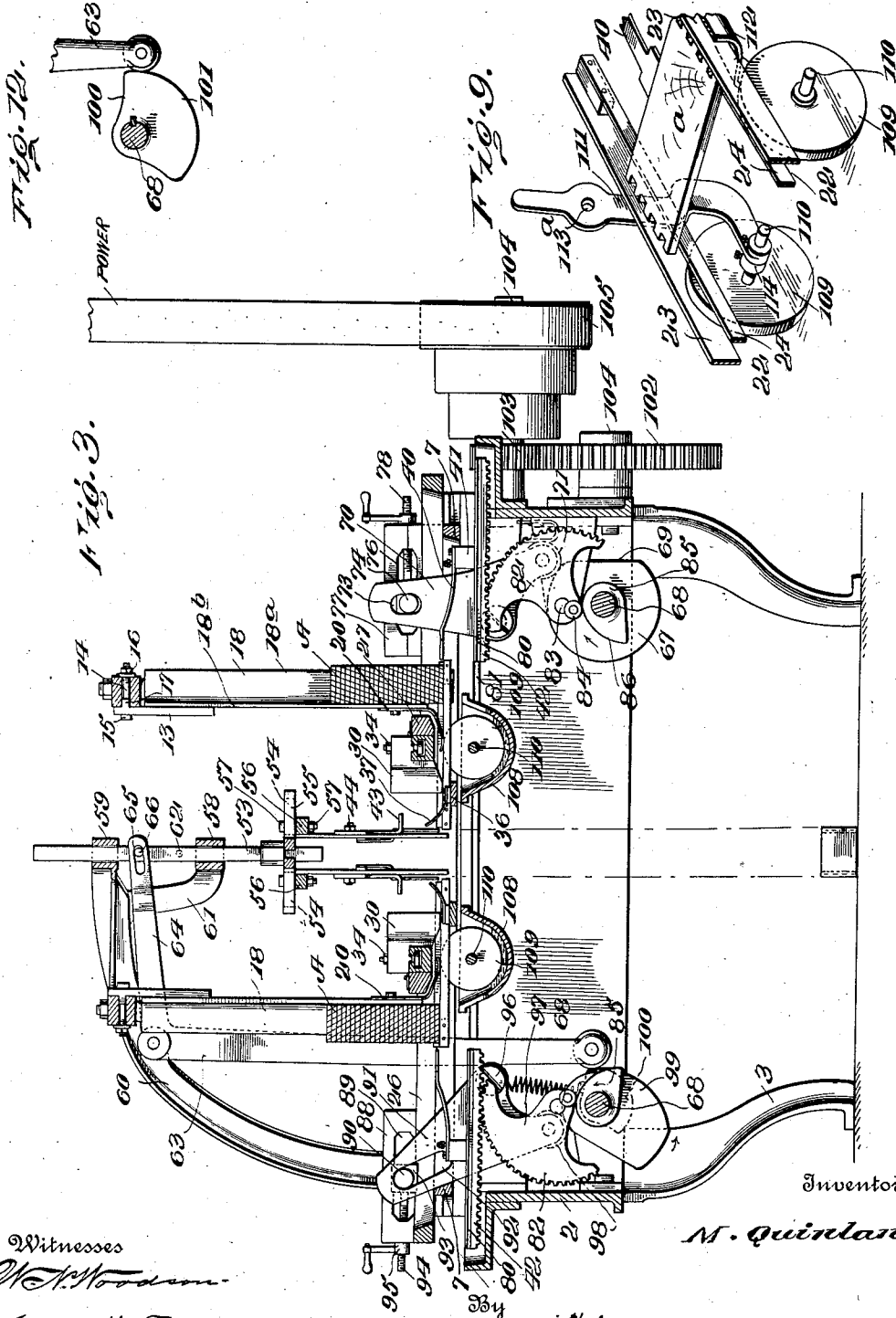
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5 SHEETS-SHEET 2.

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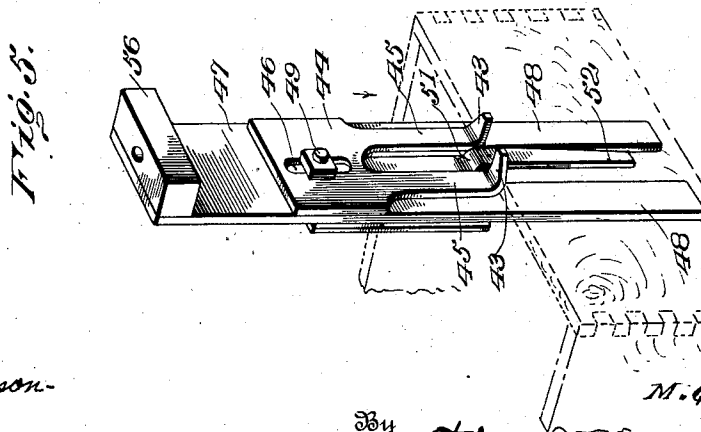
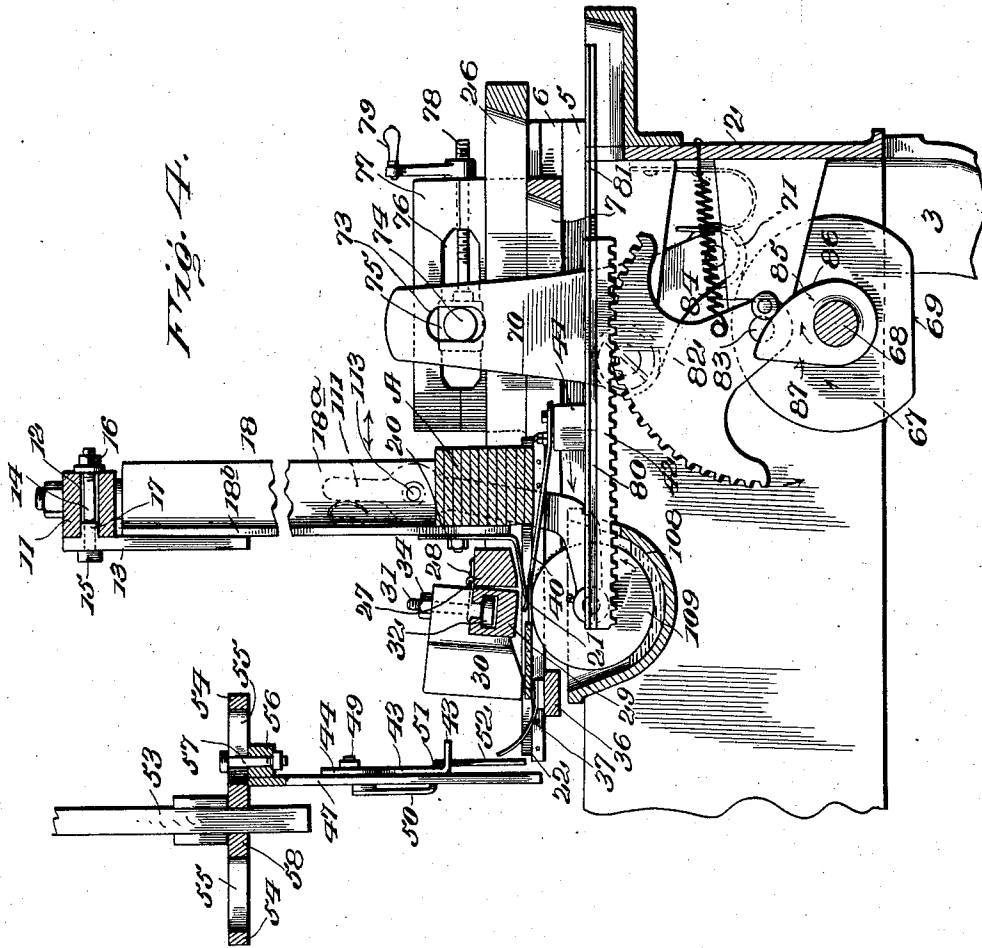
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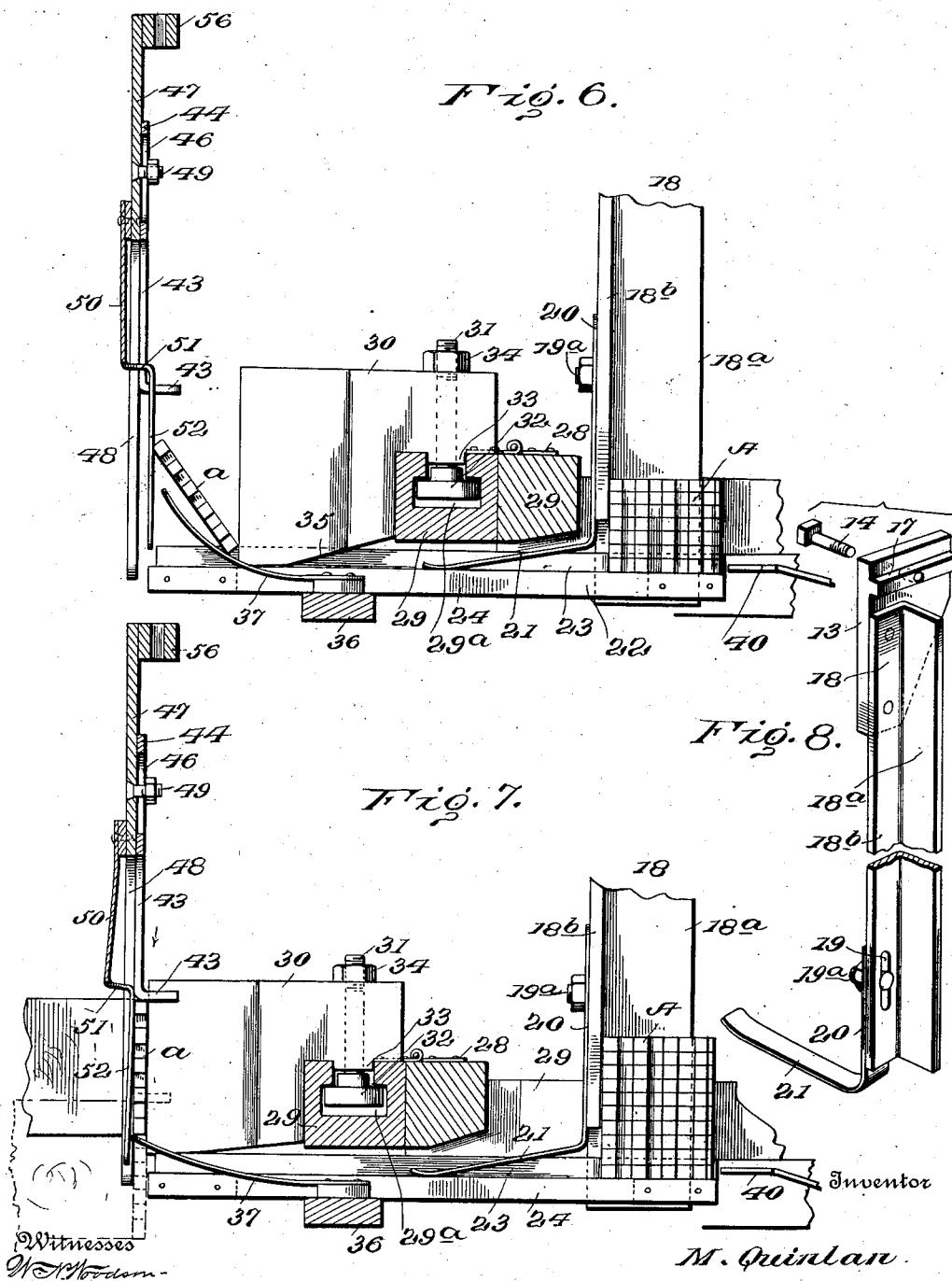
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Fig. 10.

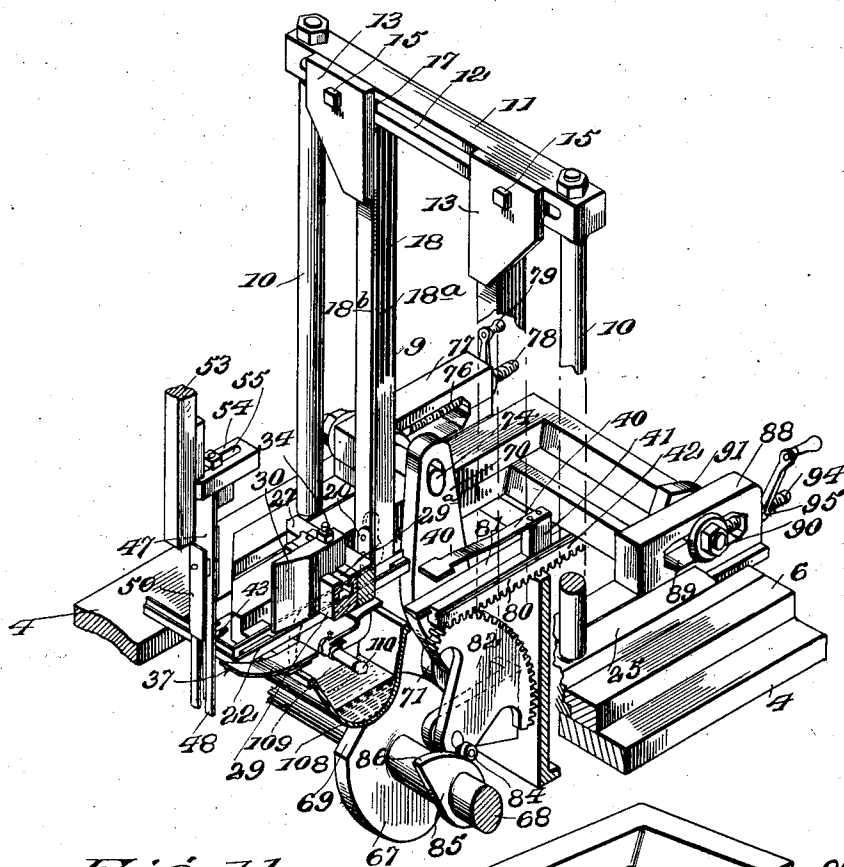
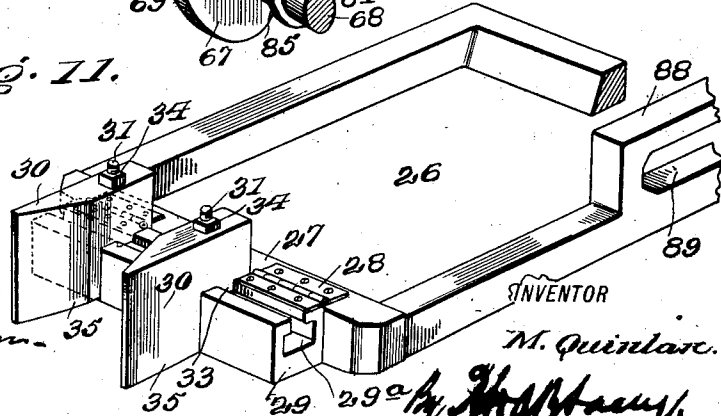


Fig. 11.



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BOX-MACHINE.

1,021,703.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MICHAEL QUINLAN, citizen of the United States, residing at Monkton, in the county of Addison and State of Vermont, have invented certain new and useful Improvements in Box-Machines, of which the following is a specification.

My invention relates to machines for assembling and forming wooden boxes, and the primary object of my invention is the provision of a relatively simple and efficient machine for automatically assembling and pressing into interlocking engagement with each other the tongued and mortised boards that form the sides and ends of a box, the machine being rapid in action and having a large capacity.

A further object is to provide a machine of this character in which the parts are adjustable so that it is adapted to assemble and press together either large boxes or very small boxes.

Another object is the provision of a machine which has means whereby glue may be applied to the engaging ends of the side and end boards or pieces.

A still further object is to provide means whereby the relative positions of the side and end boards may be independently regulated so that the tops of the boards may be all on the same horizontal plane or the top of any board lowered below the top plane of the remaining boards.

Other objects will appear in the course of the following description.

An embodiment of my invention is illustrated in the accompanying drawings wherein:

Figure 1 is a plan view of the machine. Fig. 2 is a side elevation, partly sectional, of the mechanism for feeding and pushing forward one of the boards, the supporting frame being removed. Fig. 3 is a transverse section on the line 3—3 of Fig. 1. Fig. 4 is an enlarged elevation, partly in section, of a portion of Fig. 3, showing the mechanism for feeding and pushing forward one of the boards constituting the box. Fig. 5 is a perspective view of a portion of the box former, a portion of the box being shown in dotted lines. Fig. 6 is an enlarged side elevation, partly sectional, of the parts illustrated in Fig. 4 but showing the position taken by the feeding jaws in forcing

one of the side boards of the box into a vertical position. Fig. 7 is a like view to Fig. 6 but showing the jaws in the position taken by them when the side piece or board is in its vertical position. Fig. 8 is a perspective detail view of one of the guide standards or chute members by which the boards are carried, and a spring for forcing a board as it is pushed forward down onto the ways upon which it travels. Fig. 9 is a perspective view in the nature of a diagram showing the relative positions of the glue-applying rollers, a board being shown as traveling over these rollers. Fig. 10 is a perspective view of the mechanism for feeding and pushing forward one of the box boards. Fig. 11 is a perspective detail view of one of the pressing jaw operating frames or slides with the jaws attached thereto. Fig. 12 is a detail fragmentary elevation of the cam for operating the arm 63 and a portion of said arm, the shaft 68 being shown in section.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

Referring now to Figs. 1, 2 and 3, it will be seen that my machine is supported upon a rectangular frame, designated 2, of any suitable construction and supported on legs 3. Extending from one side of the frame to the other are the spaced parallel supports 4, while disposed at right angles to the supports 4 are the spaced parallel supports 5, the distance between the supports 5 being the same as the distance between the supports 4. The supports 4 and the supports 5 form four pairs of supporting members, each pair extending at right angles to each other, and each pair of supports having mounted thereon the mechanism for feeding and moving inward one board of the box. The mechanism for feeding and moving into position the boards is exactly alike for each side of the machine and hence a description of the mechanism for feeding and moving any one board will apply to the others.

Referring now particularly to Figs. 1 and 2, it will be seen that the upper faces of the supports 4, (and the upper faces of the supports 5 as well, the supports 5 having precisely the same construction and function as the supports 4) are provided with guide strips 6 recessed on their inside edges. These guide strips are parallel to each other

and receive between them a slide 7. This slide is rectangular in its general form, the forward end of the slide, however, being contracted as at 8. Preferably the slide 7 is in the form of a frame, permitting the operating mechanism to project upward inside the frame, as will be later described.

Mounted on the side pieces 9 of the frame 7 are the posts 10, these posts being connected at their upper ends by a transverse cross bar 11. The posts are screw threaded and inserted through the cross bar and provided with nuts on their ends whereby the cross bar is held in rigid engagement with the posts. The cross bar is longitudinally slotted as at 12, and mounted upon the cross bar are the two oppositely disposed slides 13 provided with bolts 14 which pass through the slot 12, the rear ends of these bolts being provided with heads 15 and with nuts 16. By this means the slides 13 may be held in any desired adjusted relation upon the cross bar. In order to prevent these slides turning relatively to the cross bar and upon the bolts 14, I form the inner face of the slide near its upper end with the transverse tongue 17 which engages in the slot 12.

Attached to each slide 13 and depending therefrom is an angular guide 18, the edge of this guide being flush with the inner edge of the slide 13, as illustrated in Fig. 8. The guides 18 are entirely supported from the slides 13 and thus from the cross bar 11, and these guides are adjustable nearer to or farther from each other by shifting the slides 13. The lower end of each guide is vertically slotted as at 19, see Fig. 8, and mounted upon the outer face of each guide is an angular spring 20. A bolt 19^a passes through the spring and through the slot 19, and by this bolt the spring 20 may be adjusted up or down. The spring 20 extends down below the lower end of the guide and is then bent downward toward the center of the machine, as illustrated in Figs. 6, 7 and 8. The spring finger thus formed I designate 21.

Attached to the lower end of each guide and projecting inward therefrom is a track bar 22 illustrated in Fig. 9. This track bar is composed of parallel spaced strips forming sides and one side 23 of the track bar extends up higher than the side 24. The side 23 is flush with the side flange 18^a of the guide 18, while the side 24 is flush with the edge of the flange 18^b of the guide. It will be understood therefore that the flange 24 is disposed below the lower edge of the flange 18^b a distance equal to the thickness of one of the boards A. Thus the board which forms the bottom of the pile of boards carried by each pair of guides 18 is supported upon the outer ends of the sides 24 and may be pushed out beneath the

flanges 18^b of the guides, the spring 21 holding the board firmly down upon the upper edge of the side flange 24.

Mounted upon the upper face of the slide 7 and disposed along the side edges of the slide, are the guide strips 25 whose positions can best be seen in Fig. 2. These guides are undercut and engage over the side edges of a slide 26 which is shown in detail in Fig. 11. This slide 26 has a cross bar 27 at its forward end and the slide is adapted to reciprocate upon and independently of the slide 7.

Hinged to the face of the cross bar 27 by hinges 28 is a grooved member 29 having a groove 29^a cut longitudinally upon its upper face, this groove being T-shaped in cross section. Mounted upon this transverse grooved carrier 29 are a pair of pressing jaws 30 having beveled inside faces. These pressing jaws are cut away at the rear so as to fit over the carrier 29, as illustrated in Figs. 6 and 7, and passing through each jaw is a bolt 31 having an enlarged head 32 at its lower end which fits in the enlarged portion of the groove 29^a and engages with the undercut walls thereof. Preferably, and to prevent turning, the under face of the cutaway portion of the jaw 30 is formed with a tongue 33 which engages in the groove 29^a. The upper end of the bolt 31 is provided with a nut 34 whereby the bolt may be tightened and the jaw held in any desired adjusted position. It will be seen from Figs. 6 and 7 that each jaw extends down below the under face of the carrying member 29 and into a plane slightly below the upper edge of the flange 24 of the rail 22. It will be seen that the jaw can turn upward upon the hinge 28 as illustrated in Fig. 4 to permit the passage of a board beneath the jaw, the jaw being beveled at 35 to permit the board to press the jaw upward. What applies to one jaw of course applies to the other and all the pairs of jaws operate in precisely the same manner.

Mounted upon a transverse support 36, which is connected to the tracks 24 to move therewith, is a pair of upwardly curved springs 37, as best shown in Figs. 6, 7 and 10. There is one of these springs for each pair of jaws 30 and hence four springs 37 altogether in the machine. The springs are upwardly curved and are relatively strong and thus act as guides as shown in Fig. 6 whereby the board A is raised to a vertical position as the jaws 30 move toward the center of the machine.

For the purpose of ejecting the board from its position at the lower ends of the guides 18, I provide a pushing finger 40 which is mounted upon a block 41, which in turn is mounted upon a rack bar 42 operated as will be hereafter described. It is sufficient to say that this finger 40 reciprocates

cates with relation to the chute or hopper formed by the guides 18 and with relation to the jaws. As this finger moves inward or toward the center of the machine, the extremity of the finger contacts with the 5 lowermost board of the pile of boards A and shoves it out from beneath the pile of boards and beneath the spring 21. This spring 21 forces it downward for a purpose 10 to be later described. The finger as it advances forces the board beneath the downwardly extending portion of the jaws 30, as is shown in Fig. 4, until the rear edge of the board passes the inner ends of the jaws 15 30. The jaws 30 then drop behind the rear edge of the board. The forward movement of the board brings it into contact with the spring 37 which deflects the board upward as shown in Fig. 6 until it escapes the forward 20 edges of the jaws 30. The jaws 30 then move forward, forcing the board into a vertical position as shown in Fig. 7. The board is limited in its upward movement by stops 43 formed upon the bifurcated end 25 of a stop plate 44, this stop plate being bifurcated to provide two spaced parallel arms 45, the lower ends of which are outwardly turned to form the stops 43. The plate is slotted as at 46.

30 The stop plate 44 is adjustably mounted upon a forming member 47 which depends from a support as will be later described and is likewise bifurcated to provide two depending legs 48. A bolt 49 passes through 35 the body of the forming member 47, the extremity of the bolt being provided with a nut. This bolt passes through the slot 46 and by means of the bolt and nut, the stop plate 44 may be vertically adjusted upon 40 the forming member so as to control the height to which the board A will be raised by the spring 37.

Attached to the rear face of the forming member 47 is a downwardly extending 45 spring 50, the middle of this spring being outwardly bent as at 51 and then extended downward as at 52, the plane of the downwardly extending portion or tongue 52 being thus outward out of the plane of the 50 legs 48. The spring with its tongue 52 constitutes a resilient means for yieldingly clamping the board against the edges of the jaws 30, as illustrated in Fig. 7.

The spring 37 acts to push the board 55 upward and thus to raise the top of the board. The board will be pushed upward by the spring until the upper edge of the board strikes the stops 43. By adjusting the stop plate 44, therefore, the height to 60 which the board may be raised with relation to the jaws 30 (and with relation to the other boards of the box) may be adjusted. The adjustability of the stops 43 also provides for the manufacture of boxes of various 65 depths.

The forming member 47 is supported upon a depending hanger or support. There are four of these forming members, each facing one side of the box to be made, in other words, each facing a pair of jaws 70 30, these forming members being arranged in quadrilateral relation to each other. Mechanism is provided whereby the hanger supporting the forming members is raised after a box is formed to permit the box to 75 drop below the level of the machine and then again lowered to engage new boards to form a new box.

In detail, the forming members 47 are so supported that they may be adjusted nearer 80 to or farther from the jaws 30 so that boxes of various sizes may be made. For this purpose the supporting rod 53 is provided at its lower end with four outwardly projecting arms, these arms being at right angles to each other and designated 54. Each 85 of these arms is slotted as at 55. The upper end of the former 47 is provided with a projecting flange or lug 56 perforated for the passage of a bolt 57 which passes down 90 through the slot 55. It will be obvious that by this means the forming member may be adjusted along the flange to any desired position.

The rod 53 is vertically movable in guides 95 58 and 59, the guide 59 being formed as an eye carried by the extremity of a curved arm 60 which is attached to a corner of the frame of the machine and extends upward and over the machine to the center 100 thereof, so that the guides 58 and 59 are supported exactly in the center of the machine. The guide 58 is carried upon an arm 61 attached to or formed with the arm 60. The rod 53 is limited in its movement by 105 means of a limiting pin 62 which passes through the arm and contacts with the end of the guide 58. Mounted upon the arm 60 is a bell crank lever 63, one arm 64 of which is slotted as at 65 and engages with a pin 66 110 projecting from the rod 53. The other arm of this bell crank lever extends downward to a point below the bed of the machine and is there engaged by a cam as will be later described, whereby the bell crank lever shall 115 be reciprocated at predetermined times to raise and lower the formers 47.

It will be seen that the former 47 is bifurcated to permit the lower extension 52 of the spring 50 to project through between the 120 legs 48 of the former and into position to engage and guide the upper edge of the board a, as illustrated in Fig. 6.

The means for giving a reciprocating movement to the board guides 18 and the 125 tracks connected thereto, to the finger 40 and to the slide carrying the jaws 30 are as follows. Only a very limited reciprocating motion is necessary to be given to the slide 7 carrying the board guides 18 and 130

the tracks 22. I secure this movement by means of a cam 67 mounted upon a shaft 68. The cam has the form of a segment of a circle, the circle being cut away upon the chord of an arc so that the cam has a flattened face 69.

Pivotally mounted below the frame 2 of the machine in any suitable manner is a lever 70, this lever projecting up through the middle portions of the slides 7 and 26 as illustrated in the perspective view Fig. 10. The lower end of the lever 70 is formed with an antifriction roller 71 which contacts with the face of the cam 67. The lever extends vertically upward and at its upper end is formed with a relatively short elliptical slot 73, through which passes a wrist pin 74. This pin projects from a sliding block 75 shiftable in a guide slot 76 formed in a vertically disposed flange 77 carried by the slides 7. This block 75 is adjustable along the slot 76 by means of a feed screw 78 having a handle 79. By rotating the feed screw in one direction or the other, the slide block will be adjusted along the slot 76 to any desired point. By this means the slide may be adjusted relatively to the wrist pin 74. Thus when the adjusting screw 78 is turned so that the block 75 is in the forward end of the slot 76, the slide will be drawn outward to its farthest extent so as to accommodate relatively wide boards A. When the screw is so turned, however, as to cause the block to move to the inner end of the slot 76, the slide will be shifted inward or toward the center of the machine and it will be in position for operating on very small boards to make very small boxes.

It will be seen that a rotation of the cam 67 will cause a reciprocation of the lever 70 and that this through the pin 74 will cause a reciprocation of the slide 7, and that this slide will cause the tracks 22 and the spring 37 to move toward and from the corresponding former 47.

For operating the pushing finger 40 which feeds the boards, I provide the rack bar 42, previously referred to. The sides of this rack bar are grooved as at 80 and the rack bar is guided upon guide strips 81 carried by the frame 2 of the machine or supported in any other suitable manner.

Engaging with the rack bar 42 is a sector gear 82, as illustrated in Fig. 4. This sector gear is mounted upon a pivot 83 and extends beyond the pivot, and upon this extension is provided an antifriction roller 84 with which a cam 85 mounted upon the shaft 68 engages. This cam has a curved face 86 and a flat face 87. As the shaft 68 rotates in the direction of the arrow, Fig. 4, the curved face engages with the antifriction roller and rotates the sector gear in the direction of the arrow, Fig. 4. When the

curved face 86 escapes the roller 84, a spring or like device draws the sector back to its original position and with it of course shifts outward the rack bar 42 and finger 40.

In order to reciprocate the slide 26 in the same manner as the slide 7, I form one side of the slide 26, as illustrated in Fig. 11, with the upwardly extending flange or box 88 which is longitudinally slotted as at 89. Passing through this slot is a wrist pin 90 which is adjustable to any point along the slot. The wrist pin 90 is mounted upon the upper extremity of an arm 91 which is longitudinally slotted as at 92 to receive the wrist pin. The wrist pin is preferably mounted in a block 93 disposed in the slot 89, this block having projecting from it a screw 94 and being provided with a nut 95 having a handle whereby it may be operated. This is the same construction as previously described for adjusting the wrist pin 74. By rotating the handle, the block 93 may be adjusted along the slot 89 to any required position. The lever 91 is substantially triangular in form and is pivoted in any suitable manner at 96. The lever has a downwardly extending nose 97 carrying at its lower end an antifriction roller 98 which engages with a cam 99 mounted upon the shaft 68. As this cam rotates, it will move the upper end of the lever upward and inward, thus carrying the slide 26 inward or toward the center of the machine, this slide carrying with it the pressing jaws or abutments 30.

It will be seen from Fig. 10 that the flange or boxing 77 is located on one side of the slide 7, while the slotted flange or boxing 88 is located on the opposite side of the slide 26. The cams 99, 67 and 87 are so timed with relation to each other that as the upper end of the lever 70 moves rearward, the finger 40 will be carried forward or toward the center of the machine, thus causing a discharge of the lowermost board of each pile of boards A. The finger 40 moving forward carries the board beneath the spring 21 which holds the board firmly down upon the ways 22, as illustrated in Fig. 4. During this forward movement of the board, the jaws 30 are being carried rearward by means of the connection of the slide 26 to the lever 91. When the board has passed beyond the ends of the jaws 30, the rack bar 80 commences to move back, carrying with it the finger 40. At the same time the slide 26 commences to move forward, carrying with it the jaws 30, and the board *a* is forced into a vertical position, the lower edge of the board riding up on the upwardly curved spring 37. When the upper edge of the board reaches the stops 43, the board is held from any further upward movement and the continued inward movement of the jaws 30 turns the board into a

vertical position, as shown in Fig. 7, the lower edge of the board being supported by the spring 37. The continued inward movement of the jaws 30 now presses the four boards forming the sides and ends of the boxes into engagement with each other. Just before the jaws 30 are retracted, the formers 47 are raised by the upward movement of the rod 53, the jaws 30 holding the box during this period. After the formers have disengaged from the box, the jaws 30 are retracted, that is, moved outward, leaving the box supported by the springs 37. Each slide 7 is then shifted outward the small extent of its travel, withdrawing the springs 37 from beneath the box and permitting the box to drop through the center of the machine as illustrated in Fig. 3.

For the purpose of raising and lowering the rod 53, I have shown a cam 100 which has the shape illustrated in Fig. 12. It will be seen that this cam has a long period of dwell because of the concentric face 101, at which time the boards of the box are being forced into position. The cam then causes the rod 53 to raise quickly, at which time the box drops through the center of the machine as previously described, whereupon the rod 53 returns to its lowered position, carrying the formers to again engage the side boards of a box.

While I do not wish to limit myself to any particular mounting for these various cams, or any particular means of driving them, I preferably mount them as illustrated in Fig. 1, in which 68^a is a driving shaft having thereon a gear wheel 102 which is engaged by a pinion 103 mounted on a shaft 104 provided with the band wheels 105 whereby power may be transmitted to the machine.

The shaft 68^a constitutes the driving shaft for operating mechanism for feeding and placing in position one of the boards of the box, and power is transmitted from this shaft 68^a to the other three board feeding and actuating mechanisms by means of three shafts 68 extending at right angles to each other and engaged with each other by the bevel gear wheels 106 in a manner which will be obvious to those skilled in the art. Each of the shafts 68, and also the shaft 68^a which is exactly the same as the shaft 68, except that it carries upon it the means for driving the other shafts, is provided with a cam 67, a cam 99, and a cam 85. One of the shafts 68 also carries upon it the cam 100 for operating the bell crank levers 63.

It is particularly desirable that the engaging ends of the boards which form the completed box should be coated with glue or other adhesive so that the interlocking joints will have a tight engagement with each other. For this purpose I provide the troughs 108 which are supported in any

suitable manner below the machine and in which dip the rollers 109. These rollers as illustrated in Figs. 4 and 9 extend upward through the tracks on a level with the upper edges of the flanges 24 of the tracks 22 so that the boards A as they pass from the board holder or carrier must pass over these rollers. The rollers are spaced apart the width of the box so that the tongued and grooved ends of the boards will come in contact with the glue-applying rollers. It will be seen that the end faces of the boards come in contact with these glue rollers and that hence it will be the inside faces of the boards that will be coated with glue. These glue applying rollers are mounted on stub shafts 110 each projecting from an arm 111 as illustrated particularly well in Fig. 9. These arms are angular and are offset at 112 so as to extend beneath the tracks 22. The arms are each pivoted to the side of the hopper or board guide 19 by means of a bolt 113 which passes through a bolt opening 113^a in the arm. The glue applying disks 109 may be adjusted by loosening the collars 114 which hold the shaft 110 with relation to the arm 111. By this means the glue may be spread on the outer edges of the locking tongues on the board or may be applied so as to extend beyond these locking tongues and onto the main portion of the board. The glue disks may be raised or lowered by loosening the bolt 113 upon which they are pivoted and moving the arm toward or away from the center of the machine. When the disks 109 are once properly set they do not need further adjustment. The glue troughs 108 are attached to the lower slides 7 by bands passing beneath the glue troughs or in any suitable manner and move forward and back with the slides 7.

To adjust this machine for different sizes of boxes, the vertical board guides 18 which constitute hoppers are adjusted to suit the length of the boards. The nuts which clamp the shaft 74 to the flange or boxing 77 are loosened and the crank 79 turned until the ends of all the tracks meet with each other at right angles and nearly form the outside measurement of the box, as shown in Fig. 1. The slides 26 are then moved in a similar manner until the jaws 30 form the exact outside measurement of the box. The jaws are adjusted by loosening the screws 34 which hold them in the slotted ways and the two jaws are moved toward or away from each other until the jaws are as far apart as the length of the boards they are to press. The ends of the jaws may either press the boards inside the tongues or grooves or at the extreme ends of the boards. The former is shifted on the arms 54 until the formers coincide with the inside measurement of the box and the stop plate 44 is shifted vertically until the distance between the stops

43 and the rails 22 is equal to the depth of the box.

The machine is so arranged that the slides 7 move forward toward the center just before the boards are fed to the center. The pushing fingers 40 push the lower boards from the guides or hoppers over the tracks 22 and under the jaws 30, leaving the boards just ahead of the jaws, as shown in Fig. 4. The guide springs attached to the inner ends of the slides 7 raise the boards to the position shown in Fig. 7 and the jaws 30 on the slides 26 push the boards to a vertical position and press the tongued ends of the boards into engagement with each other. After the box is pressed, the formers rise. The slides 7 and 26 then move back to their original positions and as the slides 7 move back, the box drops upon a conveyer and is carried out from under the machine.

It will be noted that by the provision of the spring 37 and the adjustable stops 43, I provide for raising any one or more of the boards to a height sufficient to bring its top edge above the top edges of the other boards. The spring 37 is relatively strong and as a consequence will push the board A upward until it strikes the stop. It is the adjustability of the stop which provides for regulating the height to which any one of the side or end boards may be pushed. This construction provides for raising the two side boards relative to the end boards or vice versa, as where a slide cover is to be provided for.

It will be seen from Fig. 6 that the spring 21 acts to press the boards into contact with the rollers and hence the passage of the board from the board carrying guides 18 to the former 47 will act to rotate the rollers in the glue troughs and cover them with glue which is applied to the board in transit.

One particular advantage incident to this machine is that it will set up very small boxes, much smaller than ordinary box machines. A machine constructed in accordance with this invention will set up boxes as small as two and one-half inches long by one and one-half inches wide and can even be adjusted to set up boxes one inch wide. A further advantageous feature of this machine is that it is capable of gluing small boxes without "sticking up" the machine with glue.

While I have described what I believe to be the best form of my invention and the form which I have found to be very effective in practice, I do not wish to be limited to the details of the construction as it is obvious that many minor changes might be made therein without departing from the spirit of the invention.

Having thus described the invention what is claimed as new is:—

1. In a machine for assembling boxes,

means for supporting a series of horizontally disposed boards in superposed relation, a board pressing slide, means for feeding said boards one at a time from the board support into position in advance of said pressing slide, means for raising the board to a vertical position in front of the pressing slide, and means for reciprocating said pressing slide.

2. A box machine including four pairs of independent slides, the slides of each pair being superposed upon each other, the pairs of slides being disposed in rectangular relation to each other, one slide of each pair carrying vertical board supports and inwardly extending tracks upon which the boards are moved and the other slide of each pair carrying board engaging pressers, a former disposed at the end of each track, upwardly curved springs disposed at the end of each track and in front of said formers, means for independently reciprocating said slides to feed the boards and press them into engagement with each other to form a box, and means for releasing the formers from engagement with the box so formed.

3. A box machine including four pairs of superposed independently movable slides, the pairs of slides being disposed in rectangular relation, one slide of each pair carrying vertically disposed board guides, and the other slide of each pair carrying board engaging pressers, reciprocating board feeding devices, one for each pair of slides and engaging the boards supported in the board guides to move them into a position in front of the pressers, means for turning the boards into a vertical position as they are shifted in front of the pressers, formers located in front of each pair of slides, stops on the formers for limiting the upward movement of the boards, means for independently reciprocating said slides, and pushers, to feed the boards and press them into engagement with each other to form a box, means for withdrawing said pressers from engagement with the boards, and means for releasing the formers from engagement with the box so formed.

4. A box forming machine including in its organization a pair of superposed slides, vertical board guides mounted on one of said slides, pressing members hingedly mounted upon the other slide in advance of the vertical guides, tracks mounted upon the first named slide and extending beneath the pressing members, means for pushing the boards from the board guides and beneath the hinged pressing members, and means located in advance of the pressing members for tilting the board in a vertical position.

5. A box forming machine including in its organization a pair of superposed slides, vertical board guides mounted on one of said slides, pressing members hingedly

mounted on the other slide in advance of the vertical guides, tracks mounted upon the first named slide and extending beneath the pressing members, means for pushing a board from the board guides and beneath the hinged pressing members, and an upwardly curved spring located in advance of the pressing members for tilting the board to a vertical position.

6. A box forming machine including in its organization board guides for supporting boards in a horizontal position, tracks upon which said boards slide, an upwardly curved spring at the inner ends of said tracks, a former at the inner end of the tracks having an outwardly projecting limiting stop, and means for pushing the board along the tracks and into contact with the spring and against the former.

7. A box forming machine including in its organization superposed slides, vertical board guides carried on one of said slides, pressing members carried on the other slide in advance of the vertical guides, tracks extending beneath the pressing members, means for pushing a board from the board guides along said tracks and beneath the pressing members, means located in advance of the pressing members for tilting the board to a vertical position, and a vertically disposed former located at the ends of said tracks and having an outwardly projecting stop.

8. A box forming machine including in its organization independently reciprocating cooperating slides, vertical board guides carried by one of said slides, pressing members carried by the other slide in advance of the vertical guides, tracks extending beneath the pressing members and from the vertical board guides, means for pushing a board from the board guides along said tracks, an upwardly curved spring at the inner end of the tracks for causing a board to take a vertical position, a vertically disposed former located at the end of the track, and a stop projected from the former and engaging the edge of the board when it is turned to its vertical position and limiting the upward movement of the board.

9. In a machine for assembling boxes, a former, a track extending therefrom, a presser reciprocating toward and from the former and arranged adjacent to the track, said presser being yieldable in a plane at right angles to the plane of the track, means for feeding the board between the presser and the track into a position between the presser and the former, and means for turning the board into a plane at right angles to the direction of movement of the presser.

10. A machine for assembling boxes including in its organization vertically disposed board guides, a slide mounted in advance of the board guides and reciprocating

toward and from the board guides, pressing members hingedly mounted upon the slide for movement in a vertical plane, a track disposed beneath said slide and spaced therefrom, and means for forcing a board from the board guides onto said track, beneath the pressing members and into a position in advance of the pressing members, and means for raising the board to a vertical position.

11. A box assembling machine including in its organization a pair of cooperating superposed slides, vertical board guides carried upon one of said slides, pressing members carried upon the other slide in advance of the vertical guides, said pressing members being adjustable nearer to or farther from each other, spaced tracks carried upon the first named slide and extending beneath the second named slide, means for moving a board from the vertical board guides onto said tracks beneath the slide carrying the pressing members into position in advance thereof, means for raising said board to a vertical position, and means for relatively reciprocating the said slides.

12. A box assembling machine including in its organization a board supporting member having vertical board guides mounted thereon for supporting a series of horizontally arranged boards, a reciprocating pressing slide mounted in advance of the board supporting member, a cross bar hinged to said pressing slide for vertical movement, pressing members mounted upon said cross bar and independently adjustable therealong, a track extending beneath the said slide, and means for shifting said boards one at a time from the vertical guides onto said track along the track beneath the pressing members into a position in advance of said pressing members and raising said board to a vertical position.

13. A box assembling machine including in its organization a board supporting member having vertical board guides for supporting a series of boards in a horizontally disposed relation, a slide cooperating with the board supporting member and reciprocating toward and from the board supporting member, a cross bar forming part of said slide and disposed in advance of the board guides of the supporting member, a transversely extending slotted member hinged to the cross bar for movement in a vertical plane, pressing members mounted upon said slotted member and having devices engaging said slot permitting the pressing members to be adjusted along the slot, tracks extending beneath said slide, and means for feeding one of said series of boards onto said tracks beneath the pressing members and for raising the board to a vertical position in front of said pressing members.

14. In a machine for assembling boxes, the combination with a reciprocating board pressing slide, of a track disposed below the pressing slide and in its path of movement, a plurality of board pressing members pivotally mounted upon the slide for movement in a vertical plane, the inner faces of said members being beveled, and means for shifting a board along said track beneath said slide and into position in advance of the pressing members.

15. A box forming machine including in its organization a pair of superposed co-operating slides, oppositely disposed vertical standards mounted on one of said slides and connected at their upper ends by a cross bar, depending vertically disposed board guides mounted upon said cross bar and adjustable toward or from each other, pressing members mounted upon the other of said slides in advance of the first named slide, and tracks carried upon said board guides and laterally adjustable therewith, said tracks extending downward and beneath the slide carrying the pressing members, and means for feeding one of a series of boards carried in said board guides over said tracks to a position in advance of the pressing members.

16. A box assembling machine including in its organization a reciprocating board carrying slide, oppositely disposed vertical standards supported on the slide, a cross bar connecting said standards and longitudinally slotted, members attached to the side of the cross bar and having bolts passing through the slots, depending guides attached to said members, said guides being angular in cross section and adapted to support a superposed series of boards in a horizontal plane, a board pressing slide having pressing members disposed in advance of the board supporting slide, tracks mounted on the board guides and extending down beneath the pressing slide, a former disposed at the inner ends of the tracks, and means for feeding one of said boards from the board guides along said tracks to a position in advance of the pressing members and for raising said board to a vertical position against the former.

17. A box forming machine including in its organization, a pair of superposed slides, vertically disposed standards mounted on one of said slides, a cross-bar connecting the upper ends of the standards, laterally adjustable board guides depending from said cross-bar, pressing members hingedly mounted on the other slide in advance of the vertical guides, tracks extending from the lower ends of the board guides and beneath the pressing members, a reciprocating pusher located between the tracks, a former located at the ends of the tracks, means located in advance of the former and guiding

a board into a vertical position against the former, and means for reciprocating the pushing devices and the slides.

18. In a box forming machine, vertically disposed board guides for supporting superposed boards in a horizontal position, said guides being adjustable nearer to or farther from each other, and independent tracks mounted upon said guides and adjustable therewith, board pressing members mounted above said tracks in advance of the guides, and means for feeding a board from said guides along the tracks into position in advance of the board pressing members.

19. In a box assembling machine, oppositely disposed vertically extending board guides for supporting a series of superposed boards in a horizontal position, said guides being adjustable nearer to or farther from each other, parallel track members mounted upon the lower ends of said guides and extending out therefrom, said track members comprising each an outer strip and an inner strip, the outer strip being higher than the inner strip, the said strips being spaced apart, laterally adjustable board pressing devices disposed immediately above said tracks and reciprocating toward or from the board guides, reciprocating means for forcing the lowermost board of the series contained in the board guides along said track and beneath the pressing devices, and means for turning said board into a vertical position in advance of the pressing devices.

20. In a box forming machine, a board track, means for feeding a board flat-wise along the track, means for turning the board into a vertical position, and yieldingly elevating the board, and means for engaging the upper edge of the board when in a vertical position for limiting its upward movement under the impulse of the elevating means.

21. In a box assembling machine, a board track, means for feeding the board flatwise along the track, means for turning the board into a vertical position and yieldingly elevating the board, and vertically adjustable means for engaging the upper end of the board when in a vertical position for adjustably limiting its upward movement under the impulse of the elevating means.

22. In a box forming machine, a former located at the center of the machine, means for forcing a board toward the former and turning the board into a vertical position against the former, a pressing member movable toward the former, and a spring member mounted on the former and yieldingly supported in advance of the former, said spring member co-acting with the pressing member to hold the board as it is being pressed into position.

23. In a box making machine, a track, a

former disposed at the end of the track, said former being bifurcated, a spring member attached to the inner face of the former and having its lower end projecting outward through the bifurcation of the former, the lower end being then downwardly extended, means for feeding a board along the track, means for turning the board into vertical position against the face of the spring member on the former, pressing members disposed above the track, and means for forcing said pressing members against the board.

24. In a box assembling machine, a board supporting slide, a board pressing slide, means for independently reciprocating said slides with relation to each other, tracks extending from the board supporting slide beneath the board pressing slide, means for feeding a board from the board supporting slide onto said tracks and into position in advance of the board pressing slides and turning said board into a vertical position, and means for independently adjusting the length of travel of said slides.

25. In a box assembling machine, four pairs of superposed slides, the slides of each pair being independently reciprocable and the pairs of slides being arranged in rectangular relation to each other, vertically disposed board supporting members carried upon one slide of each pair, board pressing members carried upon the other slide of each pair, means for reciprocating each of said slides relatively to each other toward and from the center of the machine, means for independently adjusting the length of movement of said slides, and means for feeding boards carried by said board supporting members of each pair of slides to a position in advance of the corresponding pressing members and turning said boards into a vertical position.

26. A box assembling machine including in its organization four cooperating pairs of slides relatively movable toward each other, the slides of each pair also being relatively movable, one slide of each pair carrying vertically disposed board supporting members, pressing devices mounted upon the other slide of each pair, tracks attached to each of the board supporting slides, said tracks extending toward the center of the machine and below the pressing members, reciprocating members for independently actuating each slide, and adjustable connections between the reciprocating members and the slides whereby the inward movement of the slides toward the center of the machine may be adjusted.

27. A box machine including board guides arranged in rectangular relation adapted to support box side and end-pieces in a horizontal plane, means for feeding the pieces flat-wise from the guides, vertically

disposed yielding means for engaging the middle of each piece and sustaining the pieces in a vertical position, and pressing devices arranged to operate on said pieces on each side of the said yielding means.

28. A box assembling machine including four pairs of board guides arranged in rectangular relation to each other adapted to support box side and end-pieces in a horizontal plane, means for feeding the pieces edge-wise one by one from the guides toward the center of the machine, vertically disposed forming members located at the center of the machine, means for turning the side and end-pieces to a vertical plane and against said formers, yielding means projecting from the formers and engaging the middles of the side and end-pieces, and pressing devices arranged to operate on said pieces on each side of said yielding means.

29. In a box assembling machine, the combination with four cooperating board feeding and pressing devices arranged in rectangular relation, of formers arranged at the center of the machine and acting to limit the inward movement of the boards, means for reciprocating the board feeding and pressing devices toward and from the formers, tracks extending beneath the feeding and pressing devices and toward the formers, said tracks being reciprocable toward and from the formers, and means for raising and lowering said formers.

30. In a box assembling machine, the combination with four cooperating board feeding and pressing devices having rectangular relation to each other, of vertically disposed formers located at the center of the machine for limiting the inward movement of the boards and for supporting them in a vertical position while they are being pressed, said formers being adjustable toward or from said pressing devices, means for shifting the pressing and feeding devices toward and from the formers, adjustable means for predetermining the amount of movement of the pressing and feeding devices toward the formers, and means for raising and lowering the formers.

31. In a box assembling machine, the combination with four cooperating board supporting devices adapted to support four series of boards in superposed relation and four pressing devices coacting with the supporting devices, the supporting and pressing devices being arranged in rectangular relation to each other, of means for independently reciprocating the board supporting and the pressing devices, vertically disposed formers located at the center of the machine for limiting the inward movement of the boards and for supporting them in a vertical position while they are being pressed, four pairs of tracks attached to the

board supporting devices and extending beneath the pressing devices and toward the corresponding former, said tracks reciprocating with the supporting devices, means
 5 for feeding the boards carried by the board supporting devices from said tracks to a position in advance of the board pressing devices and for raising the boards to a vertical position against said formers, and means for
 10 reciprocating said formers.

32. In a box assembling machine, the combination with four cooperating board supporting devices having means thereon for supporting four series of boards in
 15 superposed relation, four pressing devices coacting with the board supporting devices and mounted in advance thereof and four vertically disposed formers located at the center of the machine, of tracks extending
 20 from each of the board supporting devices toward the formers and beneath the board pressing devices, reciprocable board engaging devices disposed beneath the board supporting devices and adapted to engage
 25 the lowermost board of each series and shift said board along the tracks toward the formers to a position in advance of the board pressing devices, means for turning said boards into a vertical position against
 30 said formers, means for shifting the board pressing devices toward the formers and into engagement with the boards, means for moving said board pressing devices away from the formers, means for moving the
 35 board supporting devices and the tracks carried thereby away from said formers, and means for raising the formers to permit the discharge of the completed box.

33. In a box assembling machine, the
 40 combination with four vertically disposed formers having rectangular relation with each other, said formers being located at the center of the machine, and means for raising and lowering said formers, of means for
 45 holding a board against each one of said formers and pressing said boards into engagement with each other, means for withdrawing said holding means, and means for raising said formers to discharge the completed
 50 box.

34. A box assembling machine including in its organization spaced tracks laterally adjustable with relation to each other, means
 55 for feeding a board over said tracks, means for holding the boards to the tracks, spaced glue-applying wheels located beneath said tracks in position to contact with the under side of the board, and means for adjusting said glue-applying wheels to correspond
 60 with the adjustment of the tracks.

35. A box assembling machine including in its organization spaced relatively adjustable tracks, each of said tracks being composed of spaced parallel side pieces, the outer
 65 of said side pieces extending above the in-

ner, means for feeding a board flatwise along the edge of the inner side piece, the ends of the boards contacting with the said outer side piece, a trough extending transversely beneath the tracks, a transversely extending shaft, and glue-applying rollers adjustably mounted on the shaft and projecting into the space between the side pieces of the tracks and contacting with the ends of the boards as the boards are fed along the
 70 tracks.
 75

36. A box machine including in its organization spaced tracks, vertical board guides for supporting a plurality of boards in superposed relation, means for discharging the boards from said guides into said
 80 tracks, and moving them along the tracks, an upwardly curved spring at the ends of the tracks for guiding the boards to a vertical position, springs holding the boards
 85 down upon the tracks, and glue applying rollers projecting upwardly through the tracks and adapted to contact with the ends of the boards as the boards move over the tracks.
 90

37. A box assembling machine including in its organization vertical board guides for supporting a plurality of boards in superposed relation, said board guides being adjustable toward or from each other, spaced
 95 tracks mounted upon said board guides and extending therefrom, said tracks being adjustable with the board guides toward or from each other, means for discharging the boards from said guides onto said tracks and
 100 moving them along the tracks, springs holding the boards down upon the tracks, a trough extending beneath the tracks, a transversely extending shaft, and glue-applying rollers on the shaft projecting upward
 105 through the tracks in position to contact with the ends of the boards as the boards move over the tracks, said glue-applying rollers being laterally adjustable on the shaft to correspond with the adjustment of
 110 the board guides and tracks.

38. In a box assembling machine, the combination with a former, tracks extending toward the former and a slide movable toward and from the former, of pressing jaws
 115 hingedly mounted on said slide immediately above the tracks, means for feeding the boards one by one along said tracks toward the former and beneath the hinged jaws, and an upwardly curved resilient member disposed at the end of said tracks and adjacent
 120 to the former for turning the board into a vertical position as it is forced toward the former by the pressing jaws.

39. A box assembling machine including a
 125 frame, four board supporting devices mounted on said frame and including vertical guides adapted to support a plurality of boards in superposed relation, tracks extending from each of said guides toward the cen-
 130

ter of the machine, formers located at the ends of the tracks, four board pressing devices located in advance of the board supporting devices and having rectangular relation to each other and being disposed above said tracks, means for simultaneously feeding the lowermost boards from each of the series of boards along said tracks and into position between each of said formers and the corresponding pressing devices, means for reciprocating the board supporting devices and the tracks, means for reciprocating the board pressing devices, means for turning the boards into a vertical position against said formers as the pressing devices move toward the formers, means for laterally adjusting the tracks with relation to each other, means for laterally adjusting the board supporting guides with relation to each other, means for laterally adjusting the pressing devices with relation to each other, means for adjusting the formers toward or from the said guides, means for adjusting the inward movement of the board supporting devices and the board pressing devices, and means for vertically reciprocating the said formers.

40. In a box assembling machine, the combination with a slide having board guides thereon for supporting a series of boards in superposed relation, parallel tracks attached to said slide, a slide superposed upon the first named slide and having thereon board pressing members disposed in advance of the board supporting slide and above said tracks, a former located at the end of the

tracks, a board engaging finger disposed beneath the board supporting slide, means for reciprocating the finger toward and from the former to feed a board along said tracks beneath the pressing members, means for reciprocating the board supporting slide and the tracks toward or from the former, means for reciprocating the pressing members toward and from the former, and means located adjacent to the former for engaging the board and turning it to a vertical position as the board pressing devices force the board toward the former.

41. A box assembling machine including in its organization four coöperating pairs of slides relatively movable toward each other, the slides of each pair being also relatively movable, board supporting guides mounted upon one slide of each pair and adapted to support a series of boards in a horizontal position, board pressing members mounted upon the other slide of each pair, tracks mounted upon the board supporting slides and extending beneath the pressing slides, said tracks extending toward the center of the machine, means for reciprocating the slides, and means for adjustably predetermining the movement of the slides toward each other.

In testimony whereof, I affix my signature in presence of two witnesses.

MICHAEL QUINLAN. [L. s.]

Witnesses:

FORD M. THOMAS,

MABLE D. DUNSHEE.