

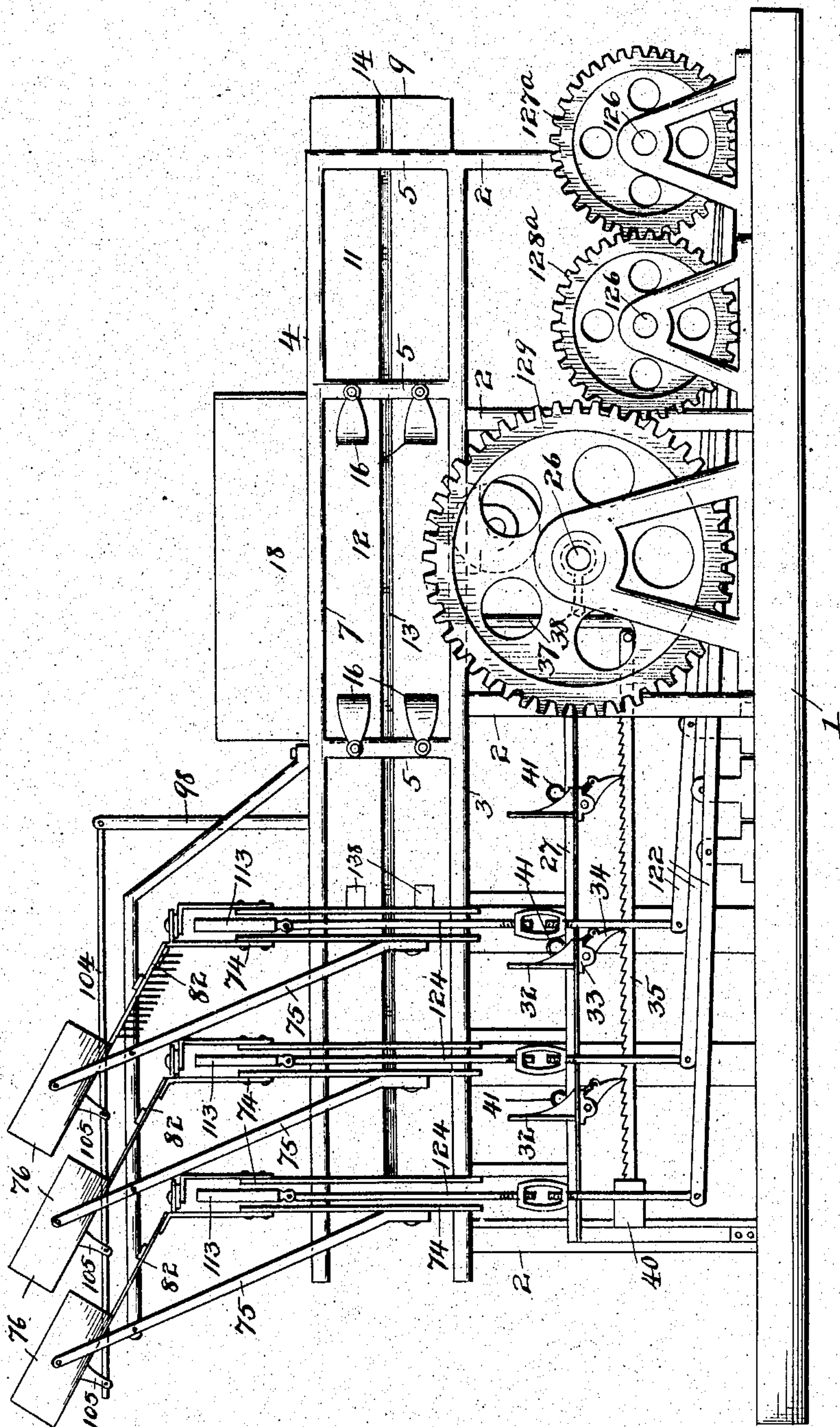
No. 786,956.

PATENTED APR. 11, 1905.

W. CORKHILL.  
BOX MAKING MACHINE.  
APPLICATION FILED DEC. 18, 1902.

7 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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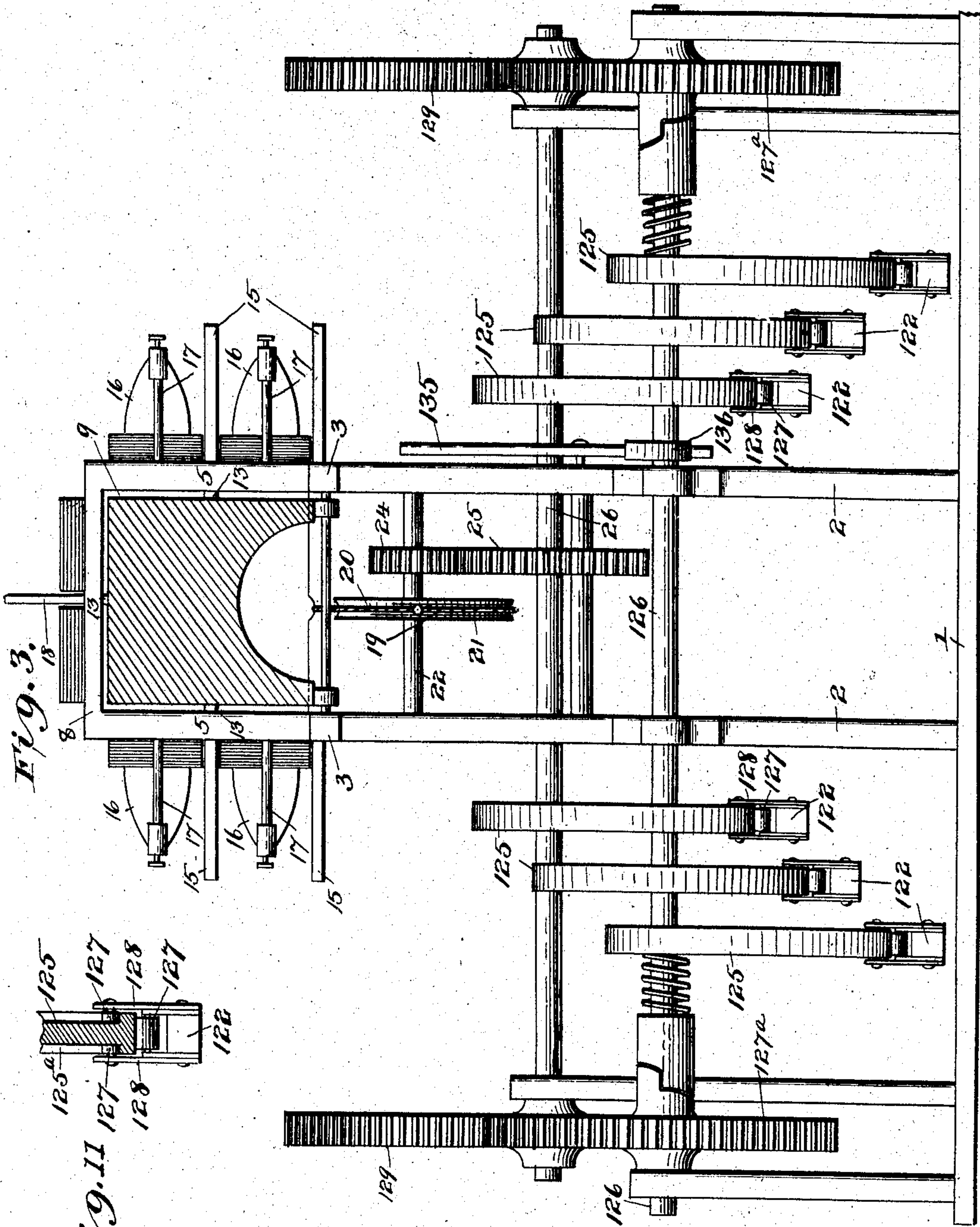


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7 SHEETS—SHEET 3.



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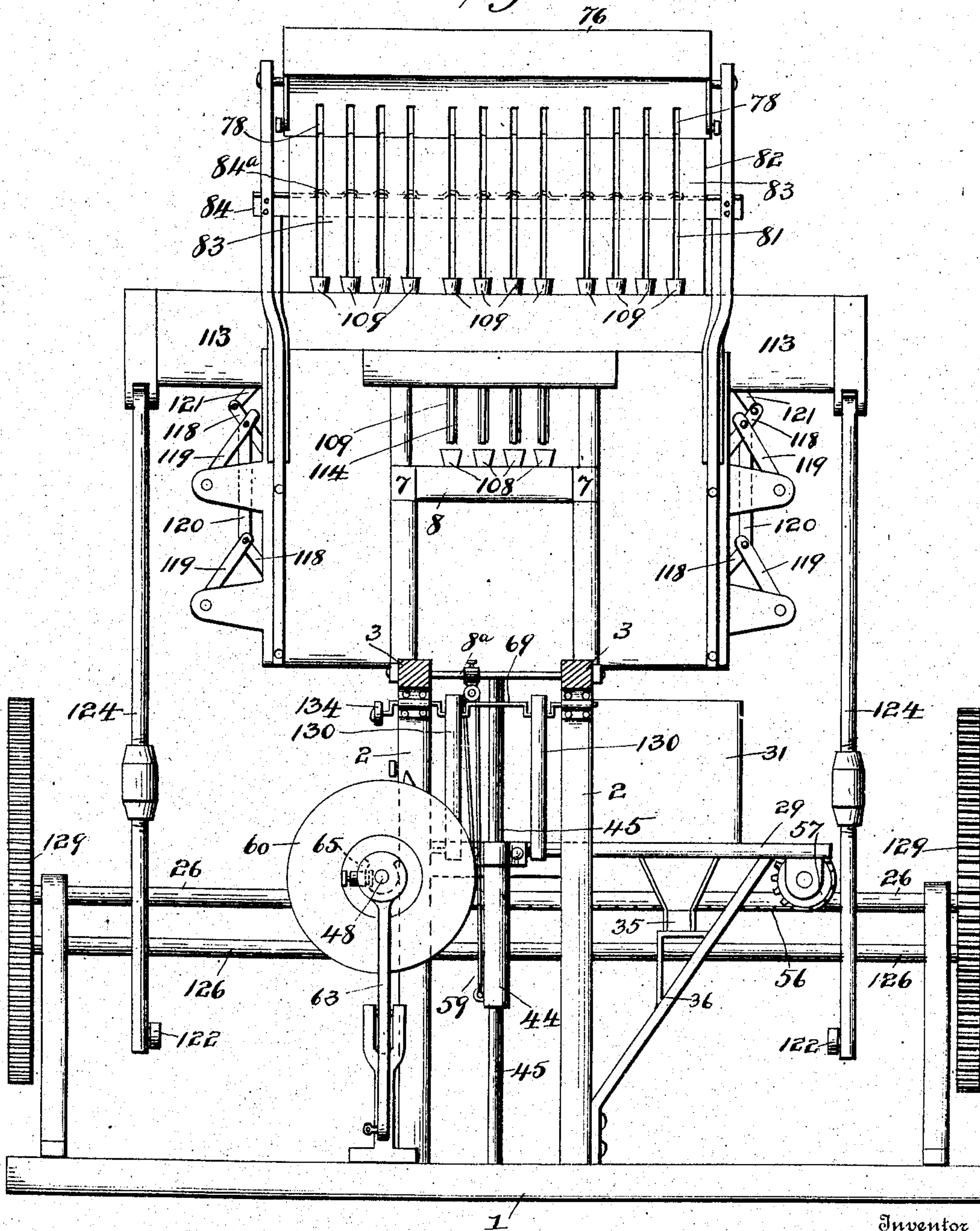
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7 SHEETS—SHEET 4.

Fig. 4.



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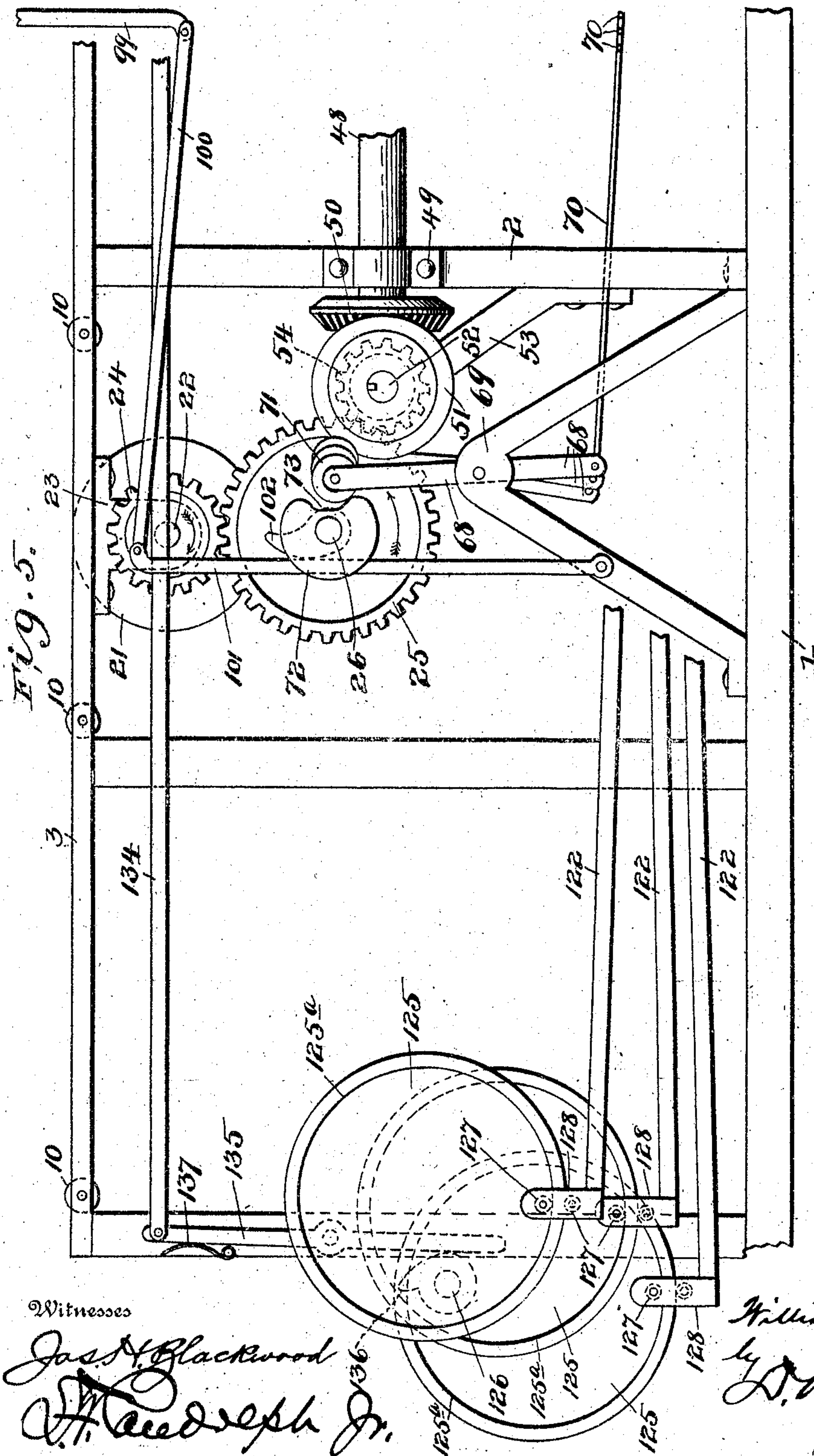
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7 SHEETS--SHEET 6.



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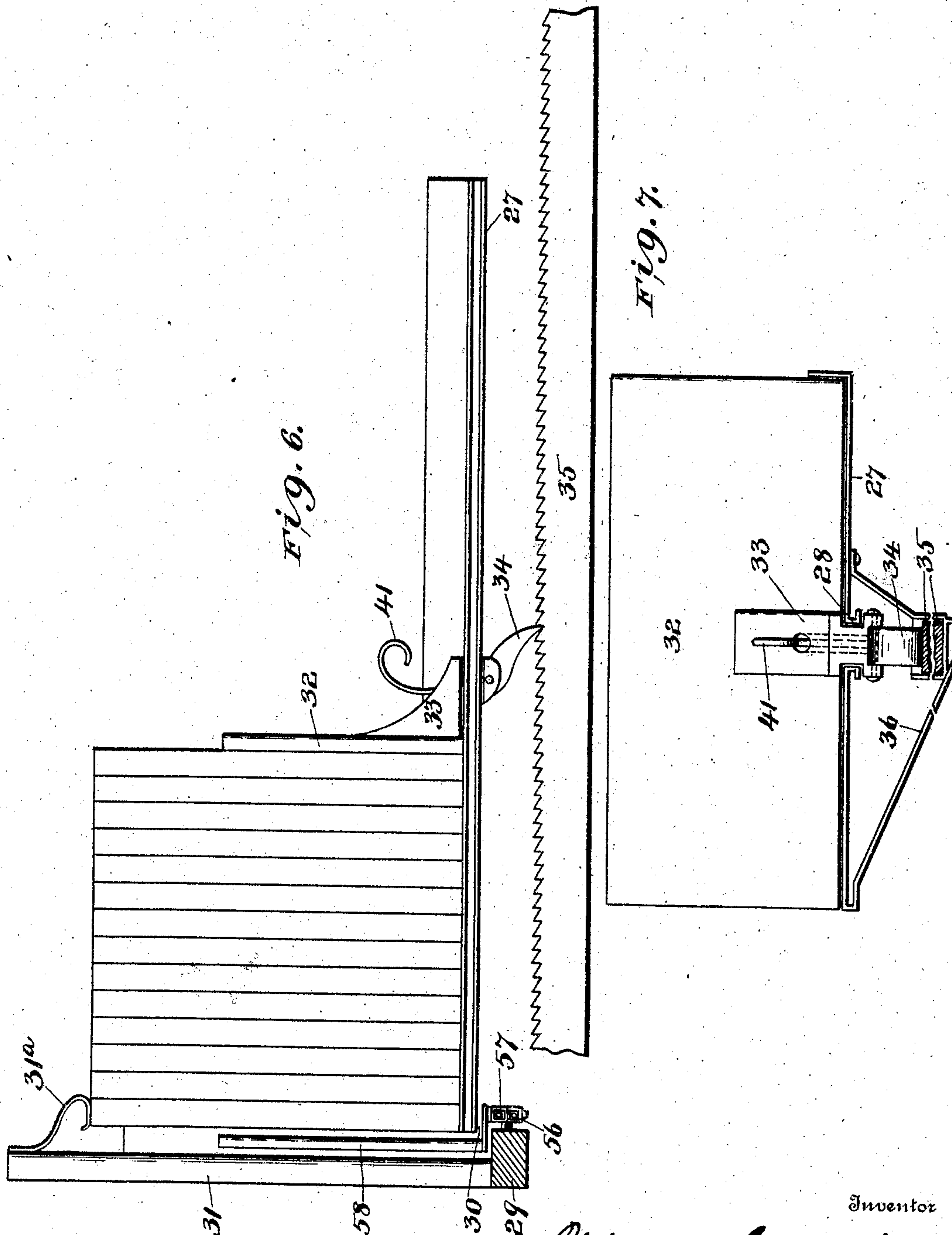


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7 SHEETS—SHEET 6.



Witnesses

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7 SHEETS—SHEET 7.

Fig. 8.

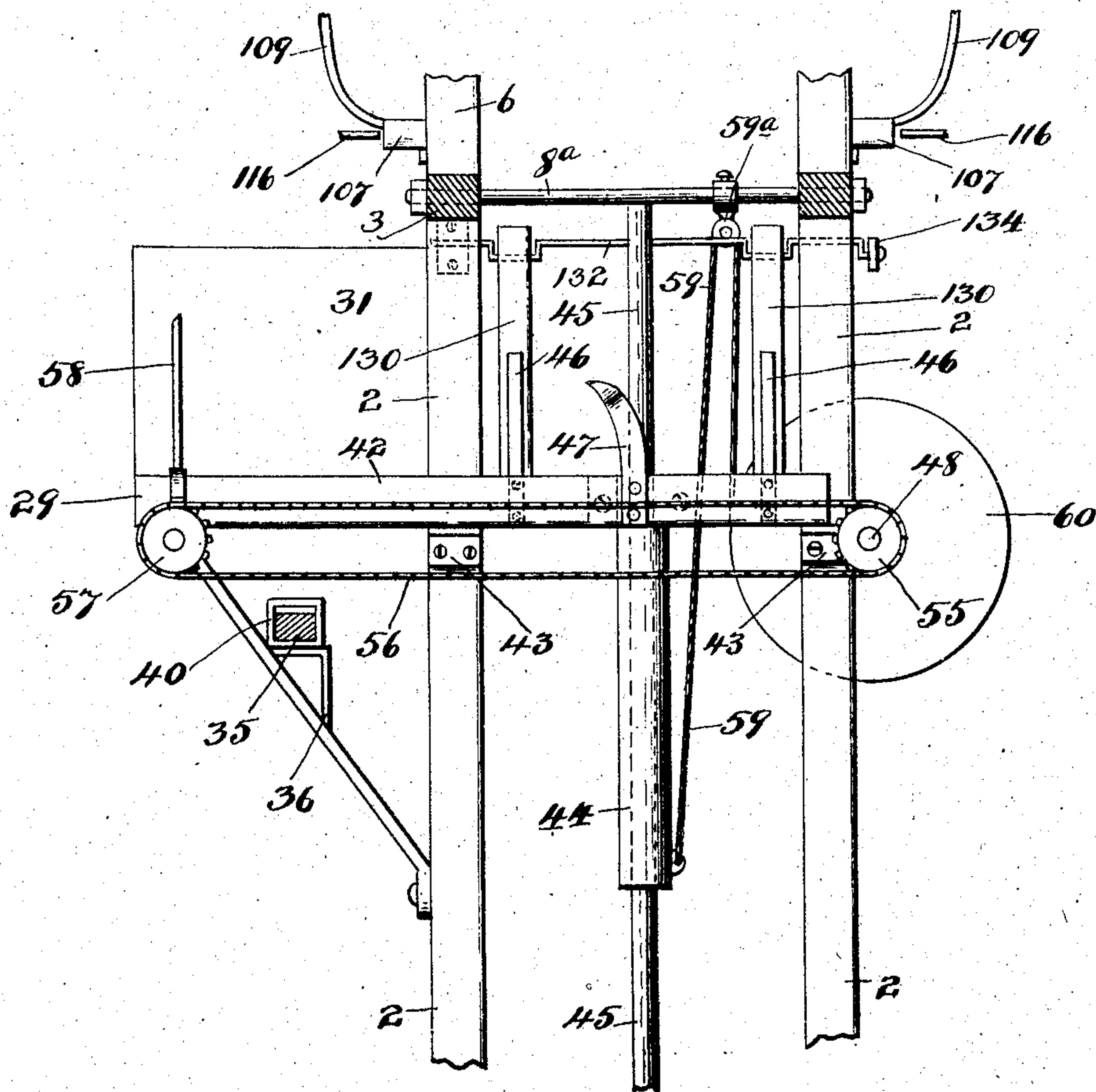
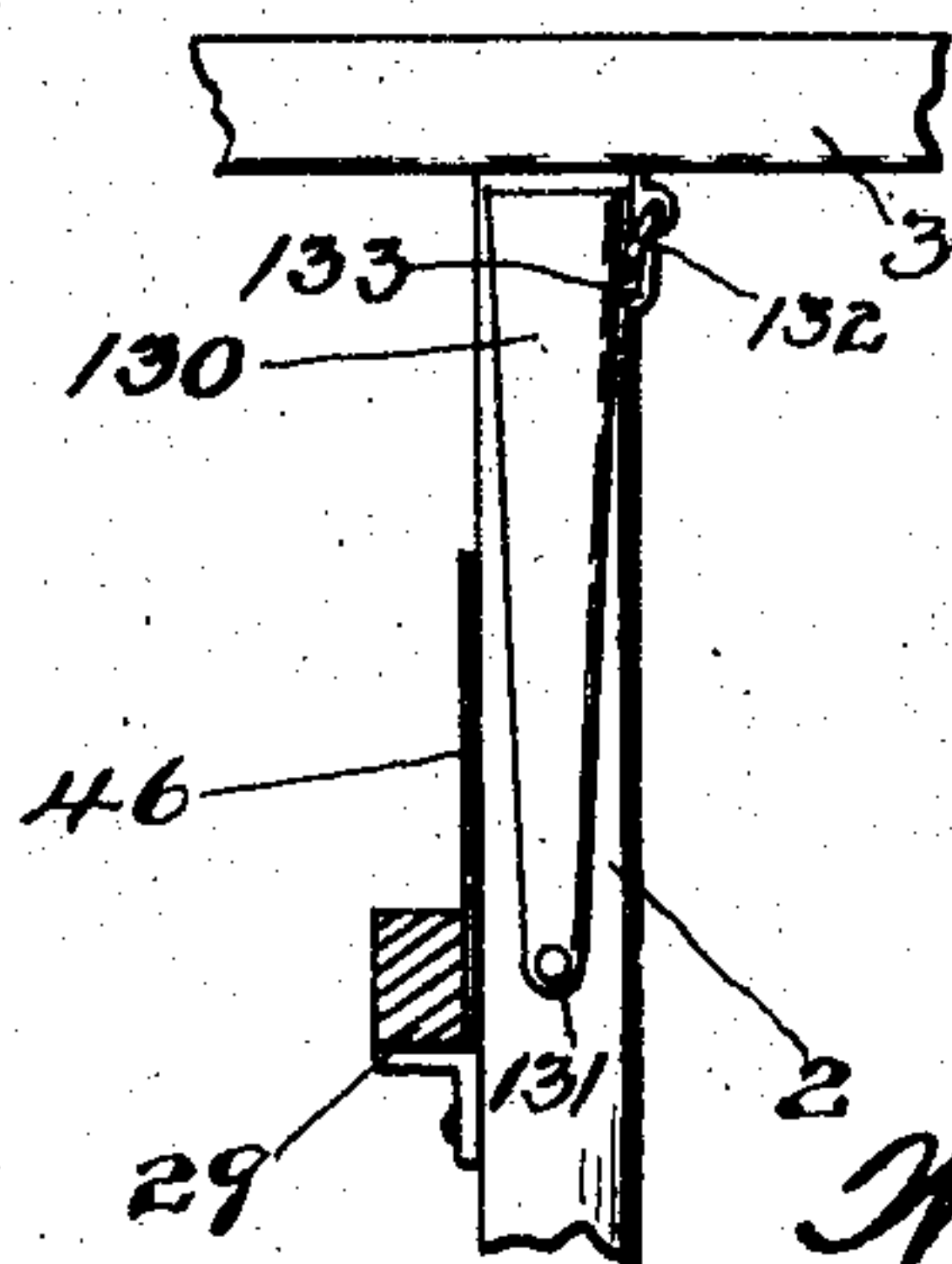


Fig. 9.



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# UNITED STATES PATENT OFFICE.

WILLIAM CORKHILL, OF CORONA, CALIFORNIA.

## BOX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 786,956, dated April 11, 1905.

Application filed December 18, 1902. Serial No. 135,741.

*To all whom it may concern:*

Be it known that I, WILLIAM CORKHILL, a citizen of the United States, residing at Corona, in the county of Riverside and State of California, have invented certain new and useful Improvements in Box-Making Machines, of which the following is a specification.

My invention relates to machines for making boxes for use as crates in shipping, and has for its object to provide a machine that will automatically assemble the bottom, sides, and ends, and when desired a transverse partition-board, and secure them together into a box.

The advantages of my invention will appear hereinafter and by reference to the accompanying drawings, in which—

Figure 1 is a view in elevation of one side of my invention; Fig. 2, a similar view of the other side; Fig. 3, a view in elevation of the feeding end of the machine; Fig. 4, a similar view of the delivery end; Fig. 5, a view showing mechanism for operating the sides and bottom conveyer; Figs. 6 and 7, a detail of the means for conveying the ends and partitions; Fig. 8, a detail of means for elevating and holding the end and partition boards; Fig. 9, a detail of one of the anvils and operating means; Fig. 10, a side view of the side and bottom conveyer; Fig. 11, a fragmental enlarged view in cross-section of one of the cams and end of lever for operating the nail-drivers.

In the drawings I show a machine for making orange and lemon boxes; but it will be readily apparent that the machine may be used for making boxes of various kinds without departing from the spirit of my invention.

Similar reference characters indicate corresponding parts throughout the several views. Referring to the drawings, 1 represents a suitable base, which may, if desired, be the floor of the factory containing my machine. Reared on base 1 are a series of parallel uprights 2, which support beams 3, on which is reared a framework 4, consisting of uprights 5 at the feeding end of said frame and uprights 6 at the assembling end, horizontal beams 7, and cross-beams 8.

9 represents a conveyer slidably mounted in framework 4, 10 being rollers journaled on

beams 3, on which said conveyer is mounted. The rear end 11 of said conveyer 9 fits snugly the inside of framework 4, while the front end 12 is narrower on each side and top than the rear end the thickness of the boards to be used in forming the sides and bottom of the box. 13 represents dividing-strips secured on the uprights 5 and 6 and cross-beams 8, the rear end of conveyer 9 being grooved, as shown at 14, to fit said strips. 15 represents shelves secured on beams 3 and strips 13 to hold shooks of boards to form the sides of the box, being fed against said conveyer by means of spring-arms 16, revolvably mounted on horizontal rods 17. 18 represents a horizontal frame for receiving shooks of boards to form the bottoms of the box. It will be understood from this description that when the conveyer 9 is drawn back, so that the larger rear end 11 is out of engagement with the boards on shelves 15 and in frame 18, the boards in each shook will bear against the end 12 of the conveyer 9 and when it is moved forward one board from each shook is carried forward, the larger end 11 of conveyer 9 holding the balance of the shooks in place.

The conveyer 9 is actuated by means of ropes 19 and 20, secured to the forward and rear ends 12 and 11, respectively, of conveyer 9 and around drum 21, keyed to shaft 22, journaled in boxes 25, secured on beams 3, said shaft 22 being actuated by means of gear-wheel 24, meshing with gear-wheel 25, keyed to the main drive-shaft 26.

27 represents shelves secured to the uprights 2 at the forward end of the machine and having a slot 28 therein. Each shelf 27 has a runway 29 at its end, separated from said shelf by a transverse slot 30, and at the farther side of runway 29 a partition 31, against which shooks of boards are placed to form the ends and partition of the box.

31<sup>a</sup> is a spring secured to partition 31 and bearing against the shook of boards to hold them in place.

32 represents upright boards adapted to be pushed against the shooks of end and partition boards, respectively, said boards 32 being secured to brackets 33, that extend through slot 28 and have pawls 34 pivoted thereto,



which intermember with the teeth of ratchet-bar 35, slidably mounted in brackets 36 under shelves 27. Ratchet-bar 35 is given a forward movement by means of lever 37, actuated by  
 5 cam 38 on shaft 26, and returned to its normal position when pressure of the lever is released by means of an expansible coil-spring (not shown) mounted in boxing 40, into which the end of ratchet-bar 35 works.

10 41 represents a lever pivoted in brackets 33 to lift pawls 34 when it is desired to withdraw boards 32 to reload with shooks of end and partition boards.

42 represents a vertically-adjustable beam  
 15 opposite each runway 29, normally seated on brackets 43 on uprights 2, 44 being a cylinder secured to said beam 42 and slidably mounted on vertical rod 45.

46 represents uprights made of hardwood  
 20 or spring-steel secured on the back of said beam 42, and 47 a spring secured on the front side of the beam to securely hold the end or partition board that may be delivered on said beam by the mechanism to be hereinafter de-  
 25 scribed.

48 represents a shaft journaled in boxing 49 on the side of uprights 2, which is driven by means of a beveled gear 50, keyed to the end of said shaft, meshing into beveled gear 51, keyed  
 30 to shaft 52, journaled in boxing 53 on one of the uprights 2, said shaft 52 being actuated by means of spur-gear 54, meshing in gear-wheel 25.

55 represents sprocket-wheels keyed to shaft  
 35 48, and 56 a sprocket-chain connecting each wheel 55 with an idler 57 at the end of runway 29, 58 being a rod secured to said chain, extending upward through slot 30 and bent to traverse said runway 29 to push the board that  
 40 may be on said runway onto the beam 42.

Beams 42 and cylinders 44 are raised by means of cables 59 passing upward over pulleys 59<sup>a</sup>, journaled on rods 8<sup>a</sup>, and then around drums 60, said drums 60 being loosely mounted  
 45 on shaft 48 and made to revolve with said shaft by means of spiral clutch 61, splined to said shaft and bearing against roller 62 on the drum. In order that clutch 61 may be actuated, I provide levers 63, fulcrumed in brackets  
 50 64, mounted on the base 1, said levers being provided with a forked upper end 65 to fit into an annular groove 66 in the clutch 61.

67 represents an expansible leaf-spring to normally hold the clutch 61 in engagement  
 55 with roller 62.

In order to withdraw clutch 62, I provide levers 68, pivoted on brackets 69, mounted on the base 1, the lower end of each lever being connected with one of the levers 63 by  
 60 means of rod 70, while the upper end of each lever 68 is provided with a roller 71, that travels on the periphery of cam 72, keyed to drive-shaft 26. Cam 72 is made circular in shape, having a depression 73 therein into  
 65 which the roller 71 passes at the proper time

for the clutch 61 to be thrown into operation, thus permitting springs 67 to act on lever 63 and push the clutch 61 into engagement with roller 62 to actuate drum 60.

74 represents parallel plates secured on 70 beams 3 and 7 on each side of uprights 6, and 75 rods secured to one of each pair of plates, at the upper end of which are pivoted the nail-feed boxes 76.

81 represents slots in a table 82 to receive 75 the nails from the boxes 76, at the lower end of said slot being a suitable nail-feed operated by means of rod 97, connected by means of levers 98 and 99, fulcrumed on beams 7 and 3, respectively, 100 being a rod connecting 80 the free end of lever 99 with lever 101, actuated by means of cam 102, keyed to shaft 26.

103 represents a spring mounted on beam 7 and bearing against lever 98 to return it to its normal position when pressure of cam 102 85 is released.

104 represents a rod connecting ears 105 on boxes 76 with lever 98 to shake said boxes when the lever is swung.

108 represents nail-receivers on beams 8, 90 and 109 tubes to convey the nails thereto, it being understood that receivers are also provided on the uprights 6, two of which are shown in Fig. 8 and designated as 107, each of said boxes being fed by means of a tube 109. 95

113 represents the nail-driving beams, having pins 114 adapted to register with holes in beams 8, connected with boxes 108, 116 being pins secured to side plates (not shown) for driving nails caught in receivers 107. 118 100 represents arms pivotally secured to said side plates, and 119 arms suitably pivoted and pivotally connected to said arms 118. 120 represents rods connecting the pivotal connections of arms 118 and 119 to insure simulta- 105 neous movement thereof, and 121 links connecting the extended ends of the upper arms 118 with beams 113. From this description it will be understood that when beam 113 is depressed the side plates (not shown) will be 110 driven toward each other, so that pins 114 and 116 simultaneously drive the nails into the box.

Beams 113 are actuated by means of levers 122, fulcrumed on brackets 123 on base 1, one 115 lever on each side of the machine being connected to beam 113 by means of upright rod 124, the other end being actuated by means of eccentrically-mounted disks 125, each of said disks being provided with a flaring edge 120 125<sup>a</sup>, on which ride rollers 127, journaled on ears 128 on the end of lever 122. Disks 125 are keyed to shaft 126, that is actuated by means of a spur-gear 127<sup>a</sup>, keyed thereto, meshing with idle-wheel 128<sup>a</sup>, that in turn 125 meshes with gear-wheel 129 on shaft 26. Disks 125 are keyed to shaft 126 in such positions that the beams 113 are operated successively, beginning with the one farthest removed from the side and bottom feeding mechanism above 130



described and arranged so that the nails are driven as soon as the end or partition is elevated into position.

130 represents wedge-shaped metal blocks, which I shall call "anvils," because of the use to which they are put, pivoted, by means of pins 131, to uprights 2 and are adapted to swing under the beams 42 when elevated, as above described, to hold the end and partition boards in position while being secured in the box. When the box has been completed, the anvils 130 are withdrawn by means of angle-rods 132, journaled on uprights 2, bearing against loops 133, secured to the rear of said anvils. Angle-rods 132 are connected in series for simultaneous operation by means of rod 134, connected to lever 135, pivoted on upright 2 at the feeding end of the machine, which is operated by cam 136, keyed to shaft 126, 137 being a leaf-spring to return the lever 135 to its normal position when pressure of the cam 136 has been relieved.

In order to hold the side and bottom boards when the conveyer 9 is being withdrawn, I provide spring-catches 138 on the uprights 6 and cross-beam 8 nearest the feeding end of the machine that spring against the end of the boards when in position for assembling and hold them in place, one of said catches 138 being provided for each board comprising the sides and bottom.

The operation of my invention is as follows: The drive-shaft 26 is operated by any suitable power to give it an oscillating motion. After the shelves 15 and racks 18 have been loaded with the boards for forming the sides and bottom of the box and the shelves 27 with boards to form the ends and partition the drive-shaft 26 is turned over toward the feeding end of the machine. This through the gearing 24 and 25 turns the drum 21 in the direction to pull the conveyer 9 to the assembling and finishing end of the machine, carrying with it the side and bottom boards, spaced apart by strips 13, until it reaches the extreme end of the machine, when the springs 138 spring into engagement with the ends of the boards and hold them in place. At the same time that this is going forward in the upper part of the machine the shaft 48 is being turned through the gearing 25, 54, 51, and 50, actuating chains 56 by means of sprocket-wheels 55, thus causing the arms 58 to each slide a board onto elevating-beam 42, where they are each held in position by means of uprights 46 and springs 47. The shaft 26 is now turned in a reverse direction, causing rope 20 to draw the conveyer 9 back to its former position. As the conveyer 9 retreats the cams 72 are so placed that their depressions 73 are successively presented to the rollers 71 on the levers at the exact time that the conveyer is passing from under that portion of the box, so that the lever 63, controlling the clutch 61, that actuated the drum 60, engages the roller

62 on the drum and turns it, the shaft 48 traveling in a reverse direction from that described above. As the drum 60 revolves the elevator 42 is raised until it finally comes to rest on the top of anvil-blocks 130, at which moment the roller 71 encounters the end of depression 73 in cam 72 and the lever 63 withdrawn, thus drawing the clutch 61 from engagement with roller 62, and the drum 60 no longer rotates with the shaft. At the same moment the disk 125 pulls the lever 122 up, drawing the rods 124 down, thus pulling the beam 113, carrying driving-pins 114, down, and by means of toggle-levers 118 the plates 115 are slid toward uprights 6, driving the nails previously deposited in boxes 107 through the holes 110 and in the receivers 108 into the sides and bottoms of the box, respectively. The other cams, 72, are so arranged on shaft 26 that the remaining elevators 42 are raised just as the conveyer passes from under that portion of the sides and bottom and the remaining disks 125 on shaft 126, arranged so that the nails are driven at the proper time, as above described. After all the end and partition boards have been secured in place cam 136 swings lever 135, turning angle-rods 132 to swing anvils 130 back from under the elevators 42, permitting them to drop to their normal positions on brackets 43. The chains 56 meanwhile had been reversed by reversing the shaft 48, so as to carry the rod 58 back to its original position, and just as the elevators 42 drop to their original position cam 38 actuates lever 37, pushing ratchet-bar 35 against the resilience of spring in box 40, carrying therewith the uprights 32 by means of brackets 33 and pawls 34 and pushing the next end board in the shook onto runway 29. At this time the machine is in the same position that it was when this description of the operation was begun and ready to be repeated, it being understood that the completed box in the machine is pushed out by the pressure of the conveyer 9 in carrying the next supply of side and bottom boards to the assembling part of the machine.

Having thus described my invention, what I claim is—

1. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling device, an elevator for raising the end and partition boards into position, a transverse conveyer for delivering the end and partition boards to said elevator, means to raise and lower said elevator, and means to secure the component parts of the box together, substantially as described.

2. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling part of the machine, elevators for conveying the end and partition boards upward as the conveyer re-



turns to its original position, a transverse conveyor for delivering the end and partition boards to said elevators, and a nailing device to simultaneously secure all the side and bottom boards to each end or partition board in turn, substantially as shown and described.

3. In a box-making machine, a reciprocating conveyor for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyor returns to its original position, a reciprocating transverse conveyor for delivering the end and partition boards to said elevators, and means to secure the component parts of the box together, substantially as shown and described.

4. In a box-making machine, a reciprocating conveyor for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyor returns to its original position, an endless chain conveyor for delivering the end and partition boards to said elevators, and means to actuate said elevators and chain conveyers, substantially as shown and described.

5. In a box-making machine, a reciprocating conveyor for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyor returns to its original position, a reciprocating transverse conveyor for delivering the end and partition boards to said elevators, longitudinal conveyers for feeding the end and partition boards to said transverse conveyers, and means to actuate said elevators and conveyers, substantially as shown and described.

6. In a box-making machine, a reciprocating conveyor for collectively delivering the side and bottom boards, elevators for successively elevating the end and partition boards into position, transversely-operating conveyers for delivering the end and partition boards to the elevators, nail assorting and delivering mechanism, vertically and horizontally reciprocating hammers, and means to actuate said mechanism, substantially as shown and described.

7. In a box-making machine, a reciprocating frame for conveying the side and bottom boards, elevators for raising end and partition boards into place for being nailed to said side and bottom boards, a reciprocating transverse conveyor to deliver said end and partition boards to the elevators, nail assorting and delivering devices, vertically and horizontally reciprocating hammers, and means to actuate said mechanism, substantially as shown and described.

8. In a box-making machine, elevators to raise boards into position, anvils to hold said

elevators in a raised position, mechanism to feed boards to said elevators, and means to operate said elevators and anvils, substantially as shown and described.

9. In a box-making machine, elevators to raise boards into position, anvils to hold said elevators in a raised position, a transversely-operating mechanism to feed boards to said elevators, and means to operate said elevators and anvils, substantially as shown and described.

10. In a box-making machine, reciprocating elevators to raise boards into position, anvils pivotally mounted and adapted to swing under said elevators when raised, mechanism to feed boards to said elevators, means to raise and lower said elevators, and means to swing said anvils from under said elevators, substantially as shown and described.

11. In a box-making machine, elevators, to raise boards into position, anvils to hold said elevators in a raised position, endless chain conveyers for feeding single boards to said elevators, and means to operate said elevators and anvils, substantially as shown and described.

12. In a box-making machine reciprocating elevators to raise boards into position, anvils pivotally mounted and adapted to swing under said elevators when raised, endless chain conveyers for feeding boards to said elevators, means to operate said elevators and means to swing said anvils from under said elevators, substantially as shown and described.

13. In a box-making machine, elevators for raising boards into position, anvils to hold said elevators in a raised position, reciprocating endless chain conveyers for feeding boards to said elevators, and means to operate said elevators and anvils, substantially as shown and described.

14. In a box-making machine, reciprocating elevators for raising boards into position, anvils pivotally mounted and adapted to swing under said elevators when raised, reciprocating endless chain conveyers for feeding boards to said elevators, means to operate said elevators, and means to swing said anvils from under said elevators, substantially as shown and described.

15. In a box-making machine, elevators to raise boards into position, anvils for holding said elevators in a raised position, a shelf for holding shooks of boards, endless chain conveyers, an arm on each conveyor to bear against one of the boards and push it onto the elevator, and means to actuate said elevators, conveyers and anvils, substantially as shown and described.

16. In a box-making machine, elevators to raise boards into position, anvils for holding said elevators in a raised position, a shelf for holding shooks of boards, reciprocating end-



less chain conveyers, an arm on each conveyer to bear against one of the boards and push it onto the elevator, and means to actuate said elevators, conveyers and anvils, substantially as shown and described.

17. In a box-making machine, elevators to raise boards into position, anvils pivotally mounted and adapted to swing under said elevators when raised, a shelf for holding hooks of boards, reciprocating endless chain conveyers, an arm on each conveyer to bear against one of the boards and push it onto the elevator, and means to actuate said anvils, elevators and conveyers, substantially as shown and described.

18. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling device, elevators for raising the end and partition boards into position, anvils for holding said elevators in a raised position, transverse conveyers for delivering the end and partition boards to said elevators, means to operate said elevators, and means to secure the component parts of the box together, substantially as shown and described.

19. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling part of the machine, elevators for conveying the end and partition boards upward as the conveyer returns to its original position, anvils for holding said elevators in a raised position, transverse conveyers for delivering the end and partition boards to said elevators, and nailing device to simultaneously secure all the side and bottom boards to each end and partition board in turn, substantially as shown and described.

20. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyer returns to its original position, anvils for holding said elevators in a raised position, reciprocating transverse conveyers for delivering the end and partition boards to said elevators, and means to secure the component parts of the box together, substantially as shown and described.

21. In a box-making machine, a reciprocating conveyer for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyer returns to its original position, anvils for holding said elevators in a raised position, endless chain conveyers for delivering the end and partition boards to said elevators, and means to actuate said elevators and conveyers, substantially as shown and described.

22. In a box-making machine, a reciprocating

conveyer for delivering the side and bottom boards to the assembling part of the machine, elevators for successively conveying the end and partition boards upward as the conveyer returns to its original position, anvils for holding said elevators in a raised position, reciprocating transverse conveyers for delivering the end and partition boards to said elevators, longitudinal conveyers for feeding the end and partition boards to said transverse conveyers, and means to actuate said elevators and conveyers, substantially as shown and described.

23. In a box-making machine, a reciprocating conveyer for collectively delivering the side and bottom boards, elevators for successively elevating the end and partition boards into position, anvils for holding said elevators in a raised position, transversely-operating conveyers for delivering the end and partition boards to said elevators, nail assorting and delivering mechanism, vertically and horizontally reciprocating hammers, and means to actuate said conveyers, elevators and hammers, substantially as shown and described.

24. In a box-making machine, a reciprocating frame for conveying the side and bottom boards, elevators for raising end and partition boards into position to be secured to the side and bottom boards, anvils for holding said end and partition boards in a raised position, reciprocating transverse conveyers to deliver said end and partition boards to the elevators, nail assorting and delivering devices, vertically and horizontally reciprocating hammers, and means to actuate said mechanism, substantially as shown and described.

25. In a box-making machine, a reciprocating frame for conveying the side and bottom boards, elevators for raising end and partition boards into position to be secured to the side and bottom boards, anvils pivotally mounted and adapted to swing under said elevators and hold them in a raised position, means to swing said anvils from under said elevators, reciprocating transverse conveyers to deliver the end and partition boards to said elevators when in a lowered position, nail assorting and delivering devices, vertically and horizontally reciprocating hammers, and means to actuate said elevators, conveyers and hammers, substantially as shown and described.

26. In a box-making machine, a reciprocating frame having one end smaller than the other to receive the side and bottom boards and deliver them to the assembling part of the machine, reciprocating elevators for successively conveying the end and partition boards upward as the frame returns to its original position, anvils pivotally mounted and adapted to swing under said elevators to hold them in a raised position, means to swing said anvils from under said elevators, longitudinal conveyers for feeding the end and par-



tition boards to said transverse conveyers, nail  
assorting and delivering devices, vertically  
and horizontally reciprocating hammers ar-  
ranged for simultaneous operation, and mech-  
5 anism to actuate said elevators, conveyers and  
hammers, substantially as shown and de-  
scribed.

In testimony whereof I hereto affix my sig-  
nature in the presence of two witnesses.

WILLIAM CORKHILL.

Witnesses:

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HERMAN M. JOHNSON.