No. 705,197. Patented July 22, 1902.

# C. W. H. BLOOD.

## BOX SETTING-UP MACHINE.

(Application filed Feb. 7, 1902.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

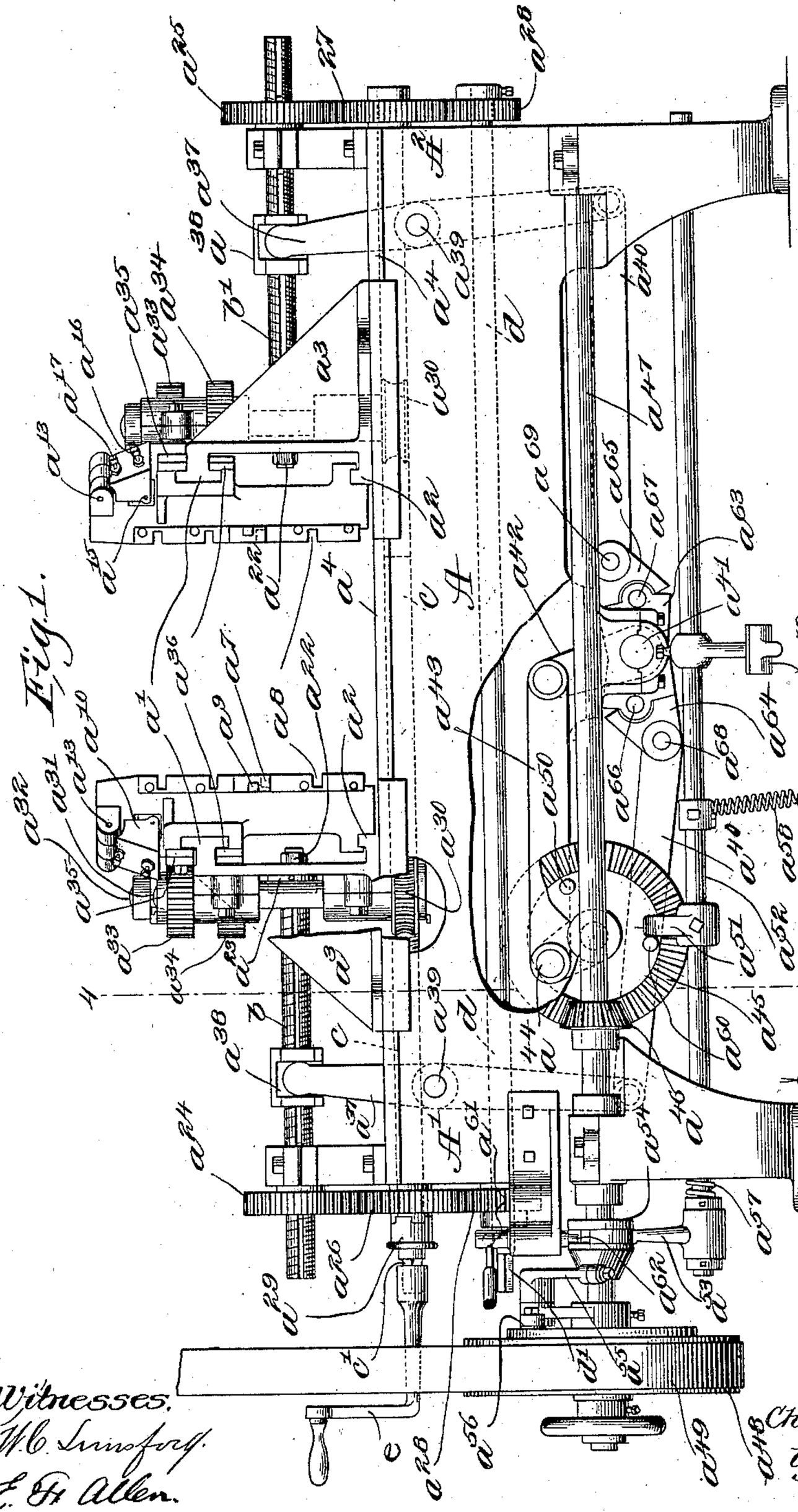
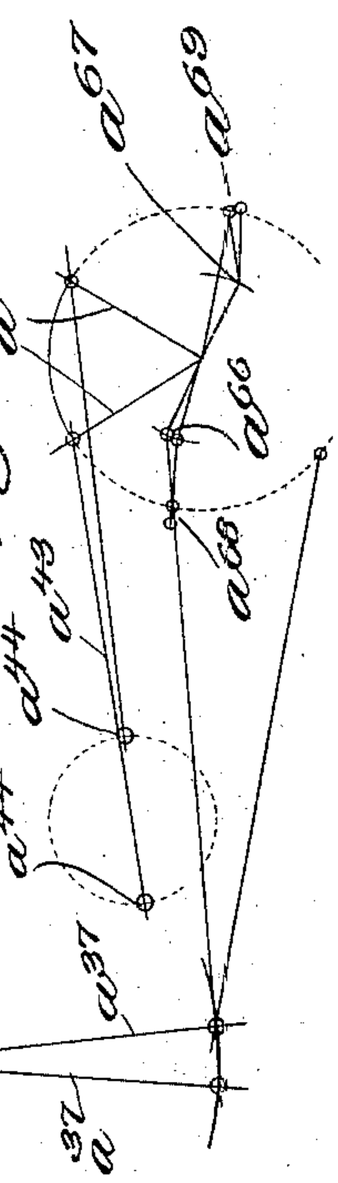


Fig. 2.



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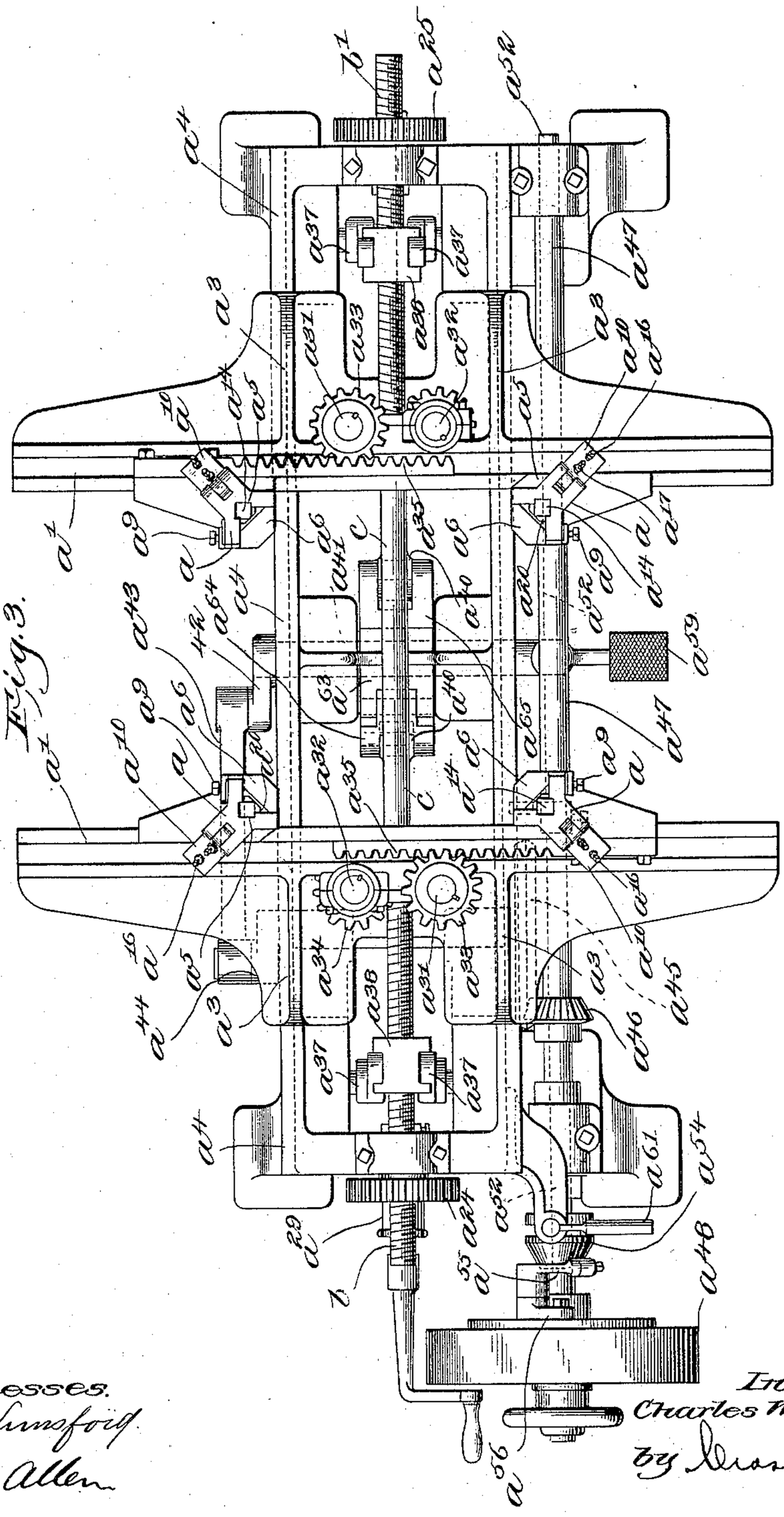
(No Model.) 4 Sheets—Sheet 2.

Fig. 3.



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## BOX SETTING-UP MACHINE.

(Application filed Feb. 7, 1902.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

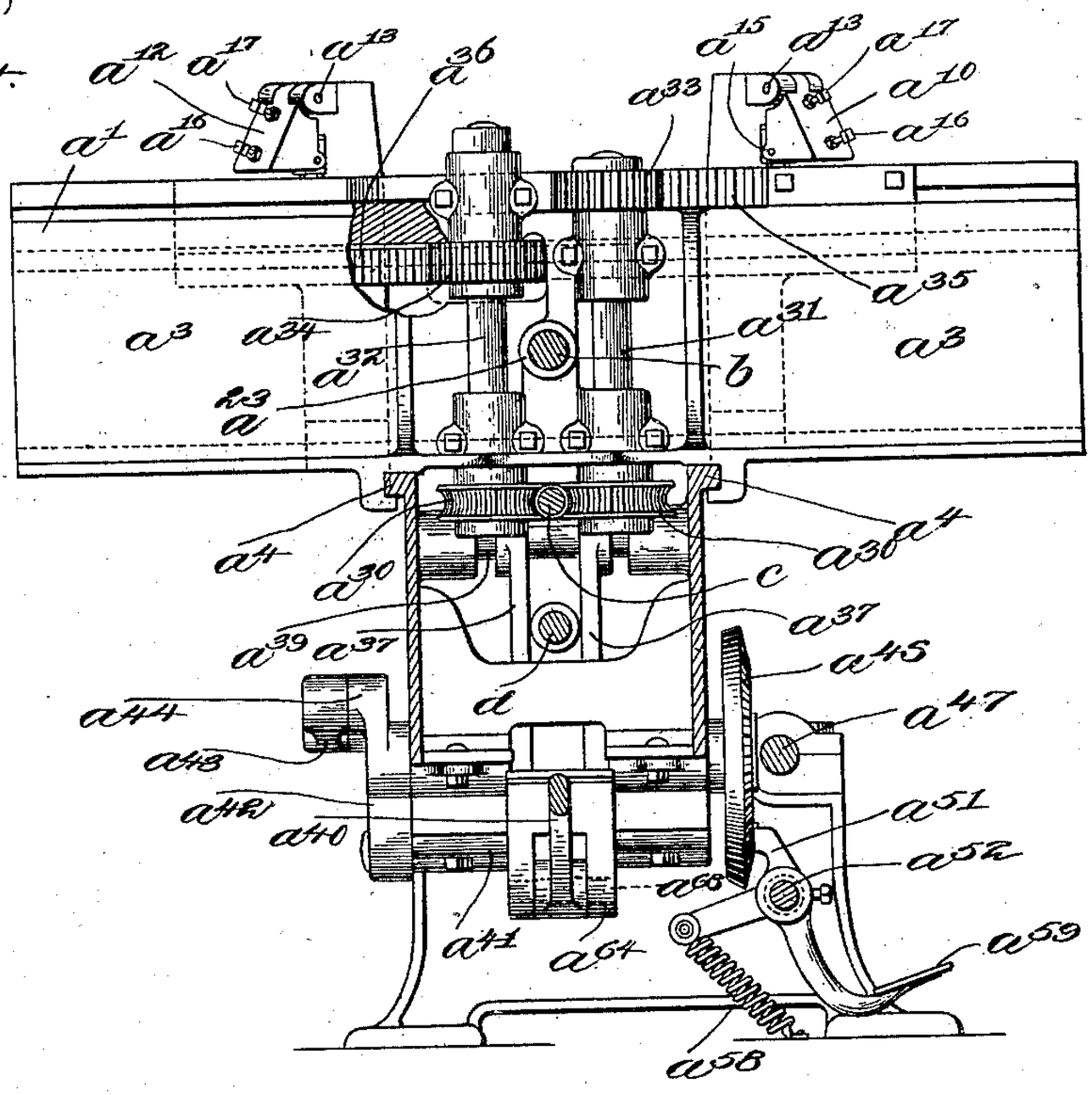



Fig. 5.

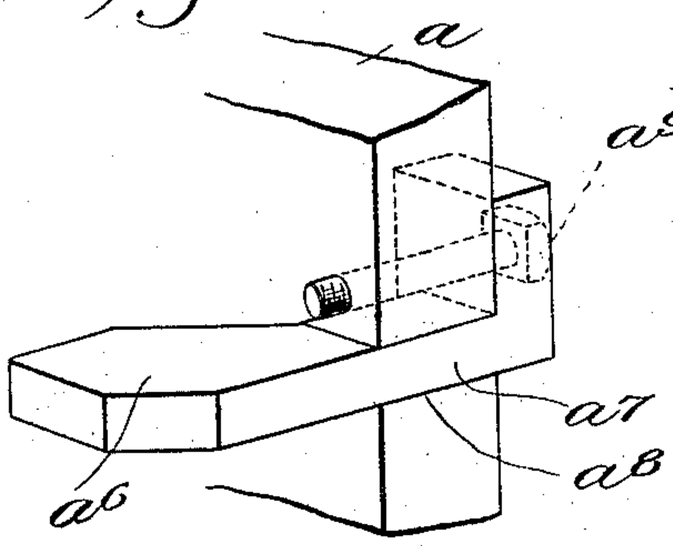



Fig. 6.

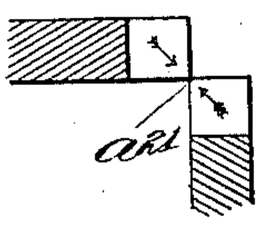
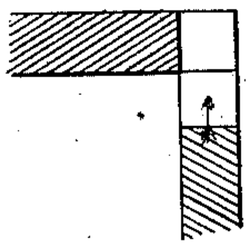



Fig. 7.



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## BOX SETTING-UP MACHINE.

(Application filed Feb. 7, 1902.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 8.

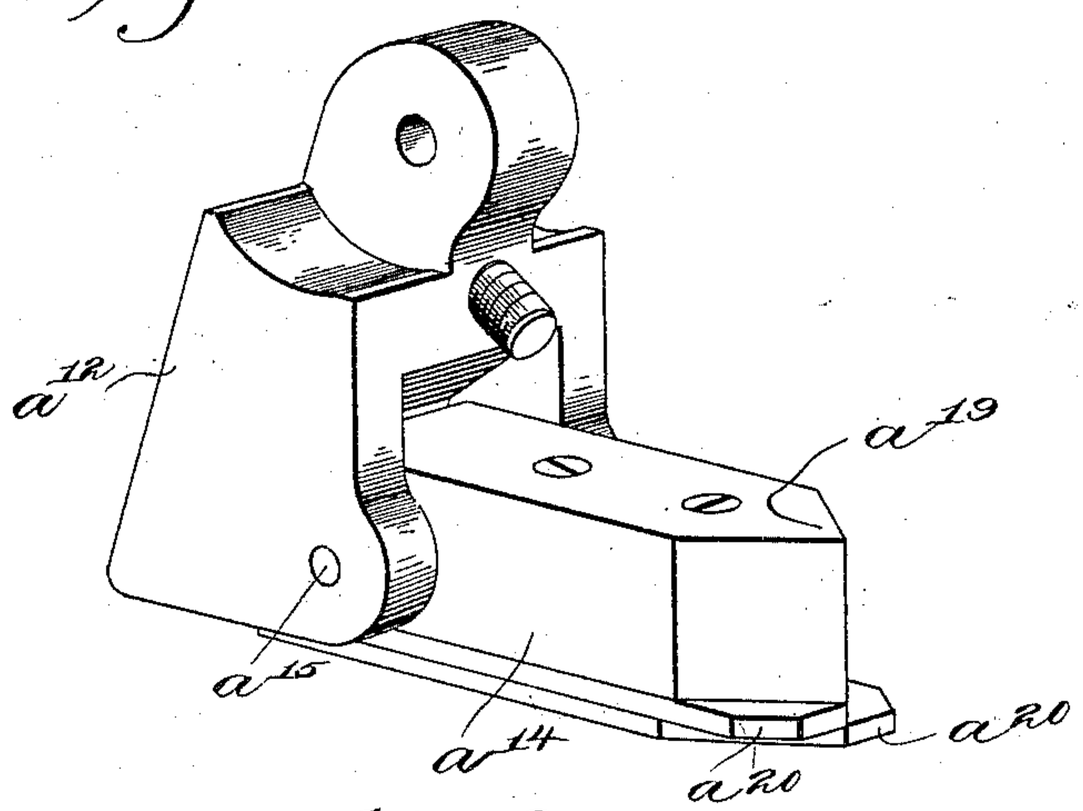
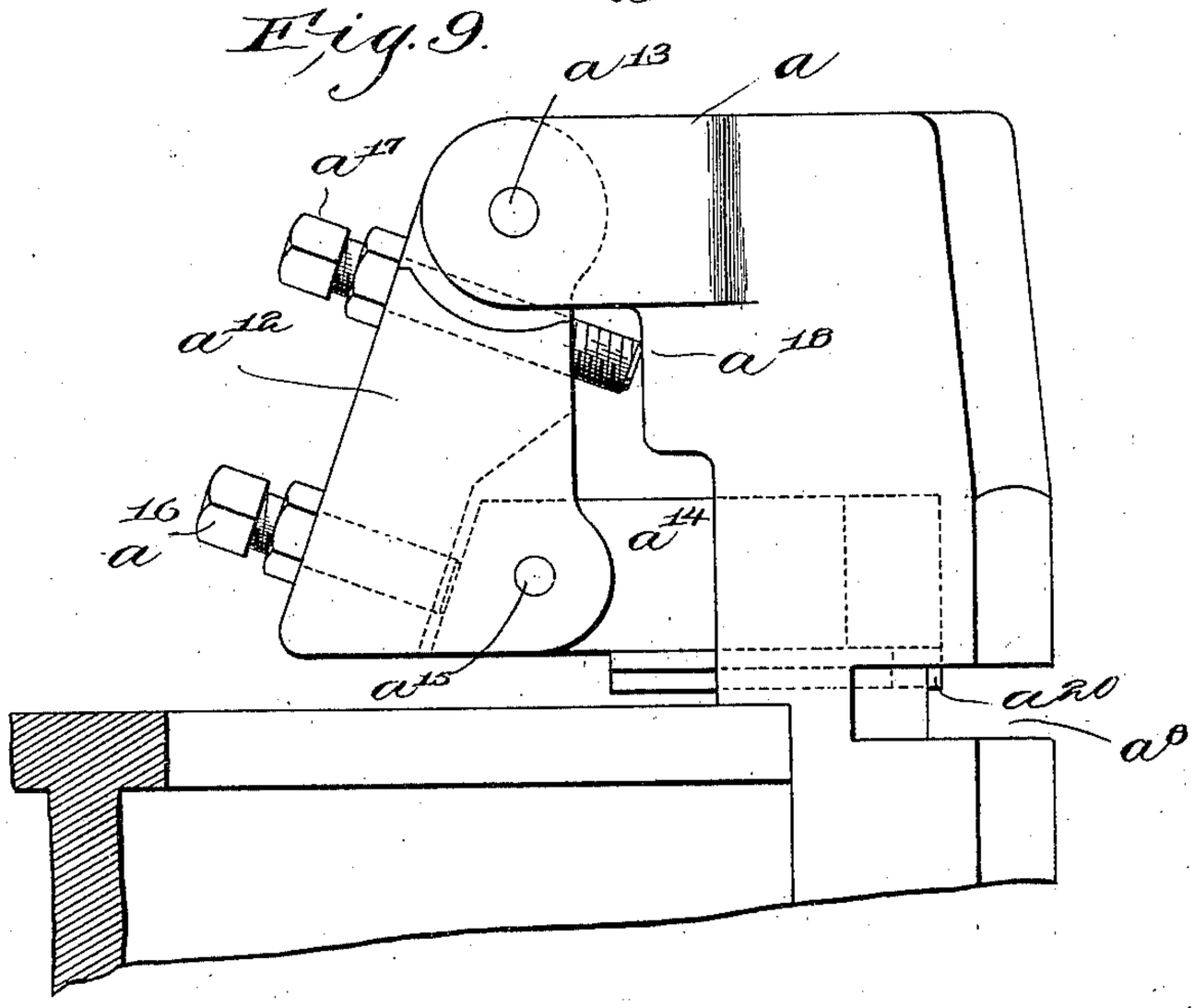



Fig. 9.

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# UNITED STATES PATENT OFFICE.

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## BOX-SETTING-UP MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,197, dated July 22, 1902.

Application filed February 7, 1902. Serial No. 93,002. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. H. BLOOD, a citizen of the United States, and a resident of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Box-Setting-Up Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is a setting-up machine for forcing together the properly-formed boards to make a locked-corner box.

Prominent among the features of novelty of my invention is the provision of means for bringing the squeezing-pressure simultaneously at all four corners toward the center, thereby giving maximum efficiency to the squeezing movement and avoiding the necessity of providing special appliances for bracing the boards against springing movement; also, the provision of a second blow or setting squeeze, which insures perfect work while permitting thin stock to yield according to its tendency in the first pressing operation; also, the provision of means for insuring that the two boards at each corner shall start toward each other at the inside corners or edges of their adjacent ends instead, for example, of having the end of one board move perpendicularly to the side of the other board. Again, I provide special means for enabling the operator quickly to set the machine for any given size without requiring any measurements or slow adjustments of independently-movable parts, this provision preferably residing in stopping the squeezing-jaws in closed position, thereby facilitating in a manner which will be more fully explained later the ready setting of the machine by the box itself.

Further features of novelty and advantages of my invention will be pointed out in the course of the following detailed description of the constructional details, reference being had to the accompanying drawings, in which a preferred embodiment of my invention is illustrated, and the latter will be further defined in the appended claims, also forming a part of this specification.

In the drawings, Figure 1 is a side elevation, parts being broken away, showing one form of my invention. Fig. 2 is a diagram for making clear the movement which gives the second squeezing pressure. Fig. 3 is a top plan view of the machine. Fig. 4 is a transverse vertical section taken on the line 4 4, Fig. 1. Fig. 5 is a perspective view of the box-support. Figs. 6 and 7 are sectional views showing, respectively, the way in which my machine squeezes the boards together and the way in which it has usually been done. Fig. 8 is a perspective view of a corner-aliner, and Fig. 9 shows the same in side elevation mounted in position.

This machine is for setting together the four boards of a box whose corners are formed by similar interlocking tongues and grooves, the boards being first sawed at their ends to provide the projecting tongues and intervening grooves or spaces and then set in the machine in proper position, whereupon the machine brings a squeezing pressure simultaneously on the respective boards, which squeezes the tongues of one board into the spaces or grooves of the adjacent board at each corner, thereby forming "locked" or interlocked corners. The preferred means of accomplishing these movements consists in providing four corner pressers or jaws $a$, separately movable on a frame A by means, as herein shown, of four shafts $b\ b'\ c\ d$, journaled in the opposite ends $A'\ A^2$ of the frame of the machine, the shafts $b\ b$ and $c$ being screw-shafts. The upper shafts $b\ b'$ are for giving the jaws movement longitudinally of the machine, the shaft $c$ is for giving the jaws lateral movement, and the shaft $d$ is simply for transmitting motion to the other shafts, and besides the foregoing simple movements certain of these shafts perform a variety of functions. Each jaw is mounted in suitable guides $a'\ a^2$ for lateral movement, said guides being provided on a slide $a^3$, moving longitudinally of the machine on ways $a^4$. (See Fig. 4.) As herein shown, each jaw has a rectangular form for embracing the corner of the box and is preferably cut out slightly at $a^5$ to permit the tongues of the respective boards to project in case they should not be cut accurately

The boards rest on ledges $a^6$, preferably adjustable, said ledges being shown as having necks $a^7$ to enter notches $a^8$ in the jaw and secured therein by set-screws $a^9$. The jaw is also provided with a device which I consider of much advantage and believe the same is entirely new, this device being termed a "locater" $a^{10}$, and is provided for the purpose of alining the boards properly with each other. In the form herein shown it comprises a block $a^{12}$, (see Fig. 8,) pivoted at $a^{13}$ at some point of the jaw, herein shown as at the top thereof, and carrying a tool $a^{14}$, shown as pivoted in the block at $a^{15}$, working through an opening in the jaw, and adjusted up or down by a bolt $a^{16}$, which bears against the inner end thereof and is capable of moving the same on the pivot $a^{15}$, while in the same manner a bolt $a^{17}$ bears on the jaw at $a^{18}$ for the purpose of moving the locater out or in.

The tool $a^{14}$ is best shown in Fig. 8 and has a corner-aliner $a^{19}$, against the opposite vertical faces of which the ends of the two boards may abut, there being at the lower end of these faces a thin projection $a^{20}$ at each side for the purpose of entering the spaces between the tongues of the respective boards, the bottom side of one projection $a^{20}$ being in the same plane with the top side of the other projection, so as to bring the two boards into exactly correct position for the tongues of one board to be forced between the tongues of the other board when pressure is subsequently applied.

The faces of the corner-aliner extend perpendicularly to the faces of the jaw, so that they bring the two boards into such position that the inner corners of the tongues thereof are against each other, as indicated at $a^{21}$, Fig. 6, and as the subsequent pressure is applied thereto in the direction of the arrows, Fig. 6, there is no danger of jamming and bruising the tongues, which frequently occurs where the boards are put together in the relation shown in Fig. 7. As the boards are squeezed together the locater $a^{10}$ swings back out of the way automatically.

The shafts $b\ b'$ are secured for convenience to the respective front and rear slides $a^3$ by nuts $a^{22}\ a^{23}$ at the opposite sides and move freely lengthwise in their journal-bearings, being provided with gears $a^{24}\ a^{25}$, in mesh with gears $a^{26}\ a^{27}$, loose on the shaft $c$, which in turn mesh with gears $a^{28}$, fast on the shaft $d$. The gears $a^{24}\ a^{25}$ are splined on the shafts $b\ b'$, respectively, and the gear $a^{26}$ is loose on the shaft $c$, but is capable of being locked to rotate with said shaft by means of a clutch $a^{29}$.

The screw-threads of the shafts $b$ and $c$ are respectively left handed and right handed, and the latter engages opposite worm-wheels $a^{30}$, whose shafts $a^{31}\ a^{32}$ carry pinions $a^{33}\ a^{34}$ respectively engaging with rack-bars $a^{35}\ a^{36}$, the former being secured to the front jaws $a$ (which I will designate "front end" jaws for convenience of description) and the latter to the rear or rear end jaws $a$, and as the worm-wheels $a^{30}$ are on the opposite sides of the worm-shaft $c$ they will rotate in opposite directions for moving the end jaws laterally of the machine.

I have devised the mechanism described above as a simple means for accomplishing the various hand adjustments desired, but do not intend to limit my broader claims thereto, as many different embodiments of the invention are contemplated within the scope of said claims. As these adjustments form a leading part of my invention I will stop at this point to explain them.

Viewing Fig. 1, it will be observed that I have provided the ends of the shafts $c\ d$ at $c'\ d'$ for receiving a hand-crank $e$. When the crank is applied to the shaft $c$ and the clutch $a^{29}$ is moved back out of locking engagement with the gear $a^{26}$, rotation of said crank and shaft over to the right will separate the front and rear or end pairs of jaws without otherwise affecting the adjustment, and rotating the shaft $c$ over to the left will draw said jaws together. If the clutch $a^{29}$ is locked with the gear $a^{26}$, as shown in Fig. 1, and the crank is turned, the result is that not only does the threaded shaft $c$ turn, but through the gear $a^{26}$ the other two shafts $b\ b'$ are rotated in unison therewith, (motion being communicated to them through the shaft $d$ and the train of gears $a^{28}\ a^{27}\ a^{25}$,) and inasmuch as the threads of the shafts $b\ c$ are of the same pitch and opposite direction the result is that the respective right-hand and left-hand jaws (which for convenience may be termed the "side pairs" of jaws, as distinguished from the end pairs of jaws, which I have spoken of as "front" and "rear," respectively) are moved longitudinally of the machine toward or from each other, without, however, moving the jaws laterally in any way, because as the shaft $b$ moves the jaws connected with it—for example, to the right—the worm-wheels $a^{30}$ are carried along thereby with the same speed, and the rotation of the shaft $c$ simply serves to permit this bodily movement of the worm without giving any rotation thereto, but instead serving to lock them against rotation. If the crank $e$ is placed on the squared end $d'$ of the shaft $d$, the clutch $a^{29}$ being moved out of locking engagement with the gear $a^{26}$, then rotation of the shaft $d$ serves through the train of gears $a^{28}\ a^{26}\ a^{24}$ at one end and the train $a^{28}\ a^{27}\ a^{25}$ at the other end of the machine to rotate the shafts $b\ b'$, thereby adjusting the side pairs of jaws toward or from each other longitudinally of the machine, and inasmuch as the gears $a^{26}\ a^{27}$ are loose upon the shaft $c$ the latter remains stationary and performs the function of a rack in connection with the pinions or worm-wheels $a^{30}$, so that as the latter are carried by the shafts $b\ b'$ longitudinally of said shaft $c$ the latter serves to rotate them, and thereby adjusts the end pairs of jaws laterally of the bed of the machine. In this way it will be seen that rotation of the shaft $d$ serves si-

multaneously to adjust all the jaws centrally toward or from each other.

From the above description it will be seen that the screw *c* performs three functions. First, it operates as a worm for setting the end pairs of jaws in or out; second, it operates to lock or hold the worm-wheels against rotation, thereby permitting the side pairs of jaws to be adjusted alone, and, third, it acts as a rack to rotate the worm-wheels $a^{30}$ and permit the simultaneous adjustment of all the jaws toward and from a common center.

When the machine is running, the simultaneous movement of all the jaws toward a common center is effected by means of levers $a^{37}$, secured at their upper ends to threaded nuts $a^{38}$, mounted, respectively, on the shafts *b b'*, said levers being intermediately pivoted at $a^{39}$ in the frame of the machine and connected at their lower ends by links $a^{40}$ to a rock-shaft $a^{41}$, whose crank $a^{42}$ is driven by a link $a^{43}$ from a preferably shorter crank $a^{44}$, whose shaft carries a bevel-gear $a^{45}$, meshing with a pinion $a^{46}$, fast on the main power-shaft $a^{47}$, driven by the belt-pulley $a^{48}$ and belt $a^{49}$. By having the crank $a^{44}$ shorter than the crank $a^{42}$ I get an increased leverage, and hence greater squeezing-pressure as the shorter crank approaches its dead-center position with relation to its shaft and the link $a^{43}$.

The various hand adjustments are for enabling the operator to set the machine accurately to fit any size of box required. If, however, the jaws in running the machine should be stopped in their expanded position or in any intermediate position of their squeezing movement, this setting of the jaws by hand, as above explained, would still leave it uncertain where the jaws had been set to fit the box, or at least further measurement or calculation would be required, and, accordingly, to make sure that the hand adjustment by the operator, as above explained, shall be absolutely correct I provide that the machine when running shall stop automatically with the jaws in closed position, thereby insuring that when the operator has placed a box on the ledges $a^{6}$ and has then adjusted all the jaws by hand into clamping contact against the corners of said box said jaws will be in absolutely correct adjustment for making that size of box. This automatic stopping mechanism may be provided in many ways, this part of my invention residing more particularly in providing automatic means for stopping the machine in closed position rather than in the particular form of means; but, as herein shown, it comprises a stop or stud $a^{50}$ on the gear $a^{45}$ in position to engage a lug $a^{51}$ on a foot-shaft $a^{52}$, mounted in the base of the machine, so as to be capable of longitudinal movement and carrying a loose arm $a^{53}$ at its left-hand end having operative connection with a clutch-operating cone $a^{54}$, whereby when the shaft $a^{52}$ is moved to the left, Fig. 1, it moves the cone $a^{54}$ into engagement with and raises an arm $a^{55}$, to thereby tighten and render operative a clutch $a^{56}$, (whose details are not herein claimed, and hence need not be shown and described, as any form of clutch will answer,) but when moved to the right permits the machine to stop. The shaft $a^{52}$ is normally held to the left, Fig. 1, by a spring $a^{57}$ and is pulled over or turned to the left, Fig. 4, by a spring $a^{58}$, being provided with a foot-lever $a^{59}$ for foot operation at proper times.

To stop the jaws in open position, I provide a stud $a^{60}$ on the gear $a^{45}$, and to enable the operator to stop the machine at any point whatever I provide a hand stop or lever $a^{61}$, having at its lower end an eccentric-pin $a^{62}$ in engagement with the cone $a^{54}$, so that when the hand-stop is turned to its full-line position it will stop the machine, thereby placing the machine under definite hand control.

As already stated, the boards, especially when thin, are apt to spring and have a sort of rebound, which tends to loosen or prevent a proper tightening of the joints, and to overcome this difficulty I have provided mechanism for giving a second blow or setting squeeze to the jaws. The form of mechanism which I prefer consists in providing a double pivoted crank-like connection between the links $a^{40}$ and the rock-shaft $a^{41}$, the rock-shaft having a plate $a^{63}$, to which blocks $a^{64}$ $a^{65}$ are pivoted at $a^{66}$ $a^{67}$, said two pivots being located, respectively, above and below alinement between the link-pivots $a^{68}$ $a^{69}$ and the shaft and the blocks $a^{65}$, and the blocks having a limited movement against the shouldered ends of the plates $a^{63}$, the result being that when the crank $a^{42}$ is thrown over to the right, Fig. 1, for closing the jaws by straightening the links $a^{40}$ the blocks $a^{64}$ $a^{65}$ and the plate $a^{63}$ remain relatively stationary to each other, as shown in Fig. 1, thereby giving the first pressure; but the moment the crank $a^{42}$ is reversed or starts on its movement back again to the left the blocks $a^{64}$ $a^{65}$ at once turn on their pivots $a^{66}$ $a^{67}$ to the limited extent permitted, thereby bringing the link-pivots $a^{68}$ $a^{69}$ in alinement therewith and with the shaft $a^{41}$, thus increasing the distance apart of said link-pivots, as shown diagrammatically in Fig. 2, thereby giving a second setting squeeze. By having the connection between the links $a^{40}$ set so that it swings past the horizontal line (best understood by viewing Fig. 2) the jaws are given a first squeeze on swinging in one direction past said horizontal line, and are given a second squeeze on swinging back again past said horizontal line, both movements, however, giving the same extent of squeeze so far as caused by simply having the connection so placed that it swings past the horizontal line in both directions; but by having the additional blocks $a^{64}$ $a^{65}$, as described, the second movement gives a squeeze to a slightly-greater extent than the first movement, as clearly shown in the diagram, Fig. 2, and I prefer this construction.

In operation the boards which are to constitute the box are placed on the ledges $a^6$, which have been adjusted to the proper height required, and the ends of the boards at each corner are quickly alined with each other by the corner-aliners $a^{19}$, which are shoved against said ends until the opposite vertical faces of each aliner strike against the ends of the respective boards, the projections $a^{20}$ thereby slipping into the proper spaces so as to bring the tongues of the boards in staggered relation to each other. The operator thereupon depresses the treadle $a^{59}$, so as to release the lug $a^{51}$ from the stop $a^{50}$, when the spring $a^{57}$ will operate to throw or move the rod $a^{52}$ to the left, Fig. 1. Since the rod has operative connection with the cone $a^{54}$ through the arm $a^{53}$, this longitudinal movement of the rod throws the said cone to the left, the said cone in its movement raising the lever $a^{55}$ and rendering the clutch operative. The shaft $a^{47}$ now being clutched to the driving-pulley $a^{48}$ is rotated thereby, and the gear $a^{45}$, which is connected to the shaft $a^{47}$ through the gear $a^{46}$, is also rotated, such rotation operating through the link-and-crank mechanism above described to move the shafts $b$ $b'$ toward each other, whereby the four jaws $a$ are simultaneously moved toward a common center, as described above, thereby squeezing the ends of the four boards together at each corner with a pressure which drives the corners of the respective boards toward each other in the direction of the arrows, Fig. 6. If the machine is to be adjusted for another size of box of the same shape, the machine is permitted to stop automatically, (thereby stopping in its closed position,) and then the crank $e$ is placed on the shaft $d$, the clutch $a^{29}$ being out of engagement with the gear $a^{26}$, and the crank is turned until the four jaws strike against the sample box which has been put in position. This sets the machine to the precise size required for making that box. If, however, the machine is to be adjusted for making a different shape of box—for example, one having the same length, but narrower width—the clutch $a^{29}$ is coupled with the gear $a^{26}$ and the crank is applied to turn the shaft $c$, and thereby the shafts $b$ $b'$ for setting up the side pairs of jaws without adjusting them transversely, the result being that the jaws are brought to the proper position at once. If, on the other hand, it is desired to set the machine for making a box of different length only, the end pairs of jaws are alone moved toward each other, this being accomplished by rotating the shaft $c$ with the clutch $a^{29}$ out of engagement with the gear $a^{26}$.

In running the machine for setting up successive boxes of the same size and shape the operator keeps his foot on the treadle $a^{59}$ during the inward-and-backward movement of the jaws and permits the stop $a^{60}$ to engage the lug $a^{51}$ for automatically stopping the jaws in their outward position ready to receive the boards for the next box; but if he wishes to stop the machine for adjustment he permits the stop $a^{50}$ to engage the lug $a^{51}$, thereby insuring that the jaws will stop in their most closed position, so that when a sample box is thereafter put in place on the ledges $a^6$ and the jaws are run up against it by hand the machine may thereafter be relied upon to set up subsequent boxes to that identical shape without any danger of crushing the box by squeezing it to a slightly smaller shape or of making an imperfect box by not squeezing it quite to that shape, and also the box will be left properly squeezed by the jaws before they finally retreat to their open position, because the provision for giving the second squeeze makes certain that the corner-joints will not loosen apart by the rebound or subsequent spring of the boards which usually accompanies the first squeeze.

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

1. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, means for pressing said boards together, and means for automatically giving a second blow or setting squeeze.

2. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, a yielding corner-aliner for holding adjacent boards at a corner with their inside corners or edges in substantial alinement, and squeezing means for forcing the boards together, said aliner yielding as the boards move toward each other.

3. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, a corner-aliner constructed to engage the ends of the adjacent boards and hold said boards with their inside corners or edges in substantial alinement, squeezing means for forcing the boards together, and means for adjusting said aliner for different thicknesses of boards.

4. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, a corner-aliner constructed to engage the ends of adjacent boards, and hold said boards with their inside corners or edges in substantial alinement, squeezing means for forcing the boards together, and means for adjusting said aliners vertically.

5. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, a corner-aliner for holding adjacent boards at a corner with their inside corners or edges in substantial alinement, and squeezing means for forcing the boards together, said aliner having projections adapted to enter the spaces between the tongues of the respective boards at said corner in proper operative position.

6. In a machine of the kind described, means for squeezing the ends of the boards

together to form a box, and means adjacent the meeting ends of two boards at a corner of the box for entering the recesses between the tongues of said boards for bringing the said tongues into proper operative position for being squeezed into interlocking box formation.

7. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, and means adjacent the meeting ends of two boards at a corner of the box for entering the recesses between the tongues of said boards for bringing said tongues into proper operative position for being squeezed into interlocking box formation, said entering means being carried by said squeezing means and yielding relatively thereto upon operation of the squeezing means.

8. In a machine of the kind described, means for supporting the boards which are to be forced together for forming a box, corner pressers or jaws for engaging the box at each corner, supporting means on which the jaws are movable toward each other, mechanism for moving said supporting means forward, and mechanism for simultaneously moving said jaws on said supporting means toward each other.

9. In a machine of the kind described, corner pressers or jaws for engaging the box at each corner, means to move simultaneously any two adjacent jaws toward and from the other jaws, and means to move all of said jaws simultaneously toward a common center, said last-named means being operative in any position of the jaws.

10. In a machine of the kind described, four corner pressers or jaws for embracing the corner of a box, said jaws comprising a pair of front end jaws and a pair of rear end jaws, means for adjusting simultaneously the jaws of one pair toward and from those of the other, and means to move all of said jaws simultaneously toward a common center, said means being operative in any adjusted position of the jaws.

11. In a machine of the kind described, four corner pressers or jaws for embracing the corner of a box, said jaws comprising two pairs of side jaws, means to move the jaws of one pair toward and from the other, and means to move all of said jaws simultaneously toward a common center, said latter means being operative in any adjusted position of the jaws.

12. In a machine of the kind described, four corner pressers or jaws for embracing the corner of the box, adjustable supporting-ledges for supporting the box-boards at different heights with relation to said jaws, means to move any two adjacent jaws simultaneously toward and from the other jaws, and means to move all of said jaws simultaneously toward a common center, said latter means being operative in any adjusted position of the jaws.

13. In a machine of the kind described, a frame, slides supported thereon and movable toward and from each other longitudinally of the frame, a pair of corner jaws or pressers mounted on each slide, the jaws of each pair being movable toward and from each other on the slide, mechanism for moving said slides toward and from each other, and means for moving the jaws on each slide toward and from each other, means permitting the operator to move either the jaws on the slides or the slides on the frame at will, and power mechanism for automatically making both of said movements simultaneously.

14. In a machine of the kind described, four corner pressers or jaws, means for moving them in opposite pairs toward each other longitudinally of the machine, means for moving them in opposite pairs toward each other laterally of the machine in a direction at right angles to their longitudinal movement, and means permitting the operator to give them both or either of these movements at will.

15. In a machine of the kind described, four corner pressers or jaws, means for moving them in opposite pairs toward each other longitudinally of the machine, means for moving them in opposite pairs toward each other laterally of the machine in a direction at right angles to their longitudinal movement, and power mechanism for automatically effecting both of said movements simultaneously.

16. In a machine of the kind described, four corner pressers or jaws, means for moving them in opposite pairs toward each other longitudinally of the machine, means for moving them in opposite pairs toward each other laterally of the machine in a direction substantially at right angles to their longitudinal movement, hand-operated mechanism therefor, and automatic power mechanism therefor, said hand mechanism and power mechanism being capable of independent operation.

17. In a machine of the kind described, a frame, opposite pairs of jaws for holding and pressing together boards to form a box, each pair of jaws being movable longitudinally of said frame, a shaft connected to each of said pairs of jaws, said shafts being oppositely threaded, and means for simultaneously moving said shafts toward and from each other.

18. In a machine of the kind described, a frame, jaws for holding and pressing together boards to form a box, guides supporting said jaws in opposite pairs for moving together longitudinally of the machine, gearing movable with said guides for moving the jaws of the respective pairs toward and from each other laterally of the machine, opposite shafts connected respectively to said opposite pairs of jaws, means for simultaneously moving said shafts toward and from each other, rack-and-pinion mechanism automatically operated by said simultaneous movement for operating said gearing, thereby causing the jaws to move laterally at the same time they are moved longitudinally.

19. In a machine of the kind described, a

frame, jaws for holding and pressing together boards to form a box, guides supporting said jaws in opposite pairs for moving together longitudinally of the machine, gearing movable with said guides for moving the jaws of the respective pairs toward and from each other laterally of the machine, opposite shafts connected respectively to said opposite pairs of jaws, means for simultaneously moving said shafts toward and from each other, worm and worm-wheel mechanism connected with said gearing, and means for rotating or holding stationary, as may be desired, the worm part of said mechanism when the longitudinal movement of said shafts takes place, whereby said worm and worm-wheel mechanism acts as a rack-and-pinion device when the worm is stationary, thereby causing lateral movement of the jaws at the same time with their longitudinal movement, and acts as a positive lock when the worm is rotated in unison with the longitudinal movement of said shafts.

20. In a machine of the kind described, a frame, jaws for holding and pressing together boards to form a box, guides supporting said jaws in opposite pairs for moving together longitudinally of the machine, gearing movable with said guides for moving the jaws of the respective pairs toward and from each other laterally of the machine, opposite shafts connected respectively to said opposite pairs of jaws, means for simultaneously moving said shafts toward and from each other, worm and worm-wheel mechanism connected with said gearing, and means for rotating said worm for the lateral adjustment of said jaws independently of their longitudinal adjustment.

21. In a machine of the kind described, a frame, jaws for holding and pressing together boards to form a box, guides supporting said jaws in opposite pairs for moving together longitudinally of the machine, gearing movable with said guides for moving the jaws of the respective pairs toward and from each other laterally of the machine, opposite threaded shafts connected respectively to said opposite pairs of jaws, means for simultaneously moving said shafts toward and from each other, worm and worm-wheel mechanism connected with said gearing, and means for rotating said threaded shafts and worm in unison or independently, as desired.

22. In a machine of the kind described, a frame having longitudinal ways, opposite slides mounted on said ways and provided with guides extending transversely of the machine, pairs of jaws mounted on said slides, automatic power mechanism for simultaneously moving said slides on said ways and said jaws on said guides, and hand mechanism for causing the same movement without disturbing said automatic power mechanism.

23. In a machine of the kind described, a frame having longitudinal ways, opposite slides mounted on said ways and provided with guides extending transversely of the machine, pairs of jaws mounted on said slides, automatic power mechanism for simultaneously moving said slides on said ways and said jaws on said guides, and hand mechanism, operating without disturbing said automatic power mechanism, for moving said slides on said ways.

24. In a machine of the kind described, a frame having longitudinal ways, opposite slides mounted on said ways and provided with guides extending transversely of the machine, pairs of jaws mounted on said slides, automatic power mechanism for simultaneously moving said slides on said ways and said jaws on said guides, and hand mechanism, operating without disturbing said automatic power mechanism, for moving said jaws on said guides.

25. In a machine of the kind described, a frame having longitudinal ways, opposite slides mounted on said ways and provided with guides extending transversely of the machine, pairs of jaws mounted on said slides, automatic power mechanism for simultaneously moving said slides on said ways and said jaws on said guides and including opposite shafts secured, respectively, to said opposite slides, opposite levers pivoted in the frame of the machine and connected, respectively, to said opposite shafts, and a rock-shaft and crank for simultaneously operating said lever, and hand mechanism, operating without disturbing said automatic power mechanism, for moving said slides on said ways, and including threaded connections between said opposite levers and said shafts, and means for rotating said shafts, thereby permitting longitudinal movement of said shafts relatively to said levers without moving the levers.

26. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said squeezing means including mechanism for bringing increasing squeezing pressure as the boards approach their final interlocking position, said means including pressing-levers, a rock-shaft connected thereto and provided with a crank, a second crank, and a link connecting the latter to the first crank for operating the same, said second crank being shorter than the first crank.

27. In a machine of the kind described, four corner-jaws for engaging the box at each corner, means to simultaneously adjust any two adjacent jaws toward and from the other jaws, power mechanism to move all of said jaws simultaneously toward a common center, and means for automatically stopping the jaws in closed position.

28. In a machine of the kind described, four corner-jaws for engaging the box at each corner, means to simultaneously adjust any two adjacent jaws toward and from the other jaws, power mechanism to move all of said jaws si-

multaneously toward a common center, and means for simultaneously stopping the jaws in open position.

29. In a machine of the kind described, four corner-jaws for engaging the box at each corner, means to simultaneously adjust any two adjacent jaws toward and from the other jaws, power mechanism to move all of said jaws simultaneously toward a common center, means for automatically stopping the jaws in either open or closed position, and manually-controlled means for determining in which position the jaws will be stopped.

30. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said means including opposite levers movable toward each other for giving squeezing pressure, a rock-shaft connected to said levers and provided with means for moving said levers toward each other when the rock-shaft is rocked in one direction, and means for giving a second movement of the levers toward each other when the rock-shaft is rocked back in the opposite direction.

31. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, mechanism for automatically operating said squeezing means, said mechanism including means for giving two distinct pressure movements, the second movement bringing the squeezing means closer together than the first.

32. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said mechanism including means for giving a first pressure movement, relieving said movement momentarily, and then giving a second pressure movement, all during the continuous rotation of the machine.

33. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said means including opposite levers movable toward each other for giving squeezing pressure, a rock-shaft joined to said levers by a double-pivoted connection, the said two pivots being located respectively above and below alinement with the rock-shaft and the pivot connection with the lever, and means permitting a limited movement only of the connection on the pivot next the rock-shaft.

34. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said means including opposite levers movable toward each other for giving squeezing pressure, a rock-shaft, a plate thereon extending rigidly in opposite directions, blocks pivoted at the free ends of said plate, said blocks being connected to said levers, and said plate and blocks having cooperating shouldered ends for giving limited pivotal movement with relation to each other, and means for swinging said blocks from one position to the other position, according to the direction of rotation of the rock-shaft.

35. In a machine of the kind described, means for squeezing the ends of the boards together to form a box, said means including opposite levers movable toward each other for giving squeezing pressure, a rock-shaft, pivotal crank-like connection between said rock-shaft and said levers for operating the latter, and means for automatically shortening and lengthening the crank movement as the rock-shaft reverses its motion after having given a first squeezing pressure.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. H. BLOOD.

Witnesses:
GEO. H. MAXWELL,
WILHELMINA C. HEUSER.