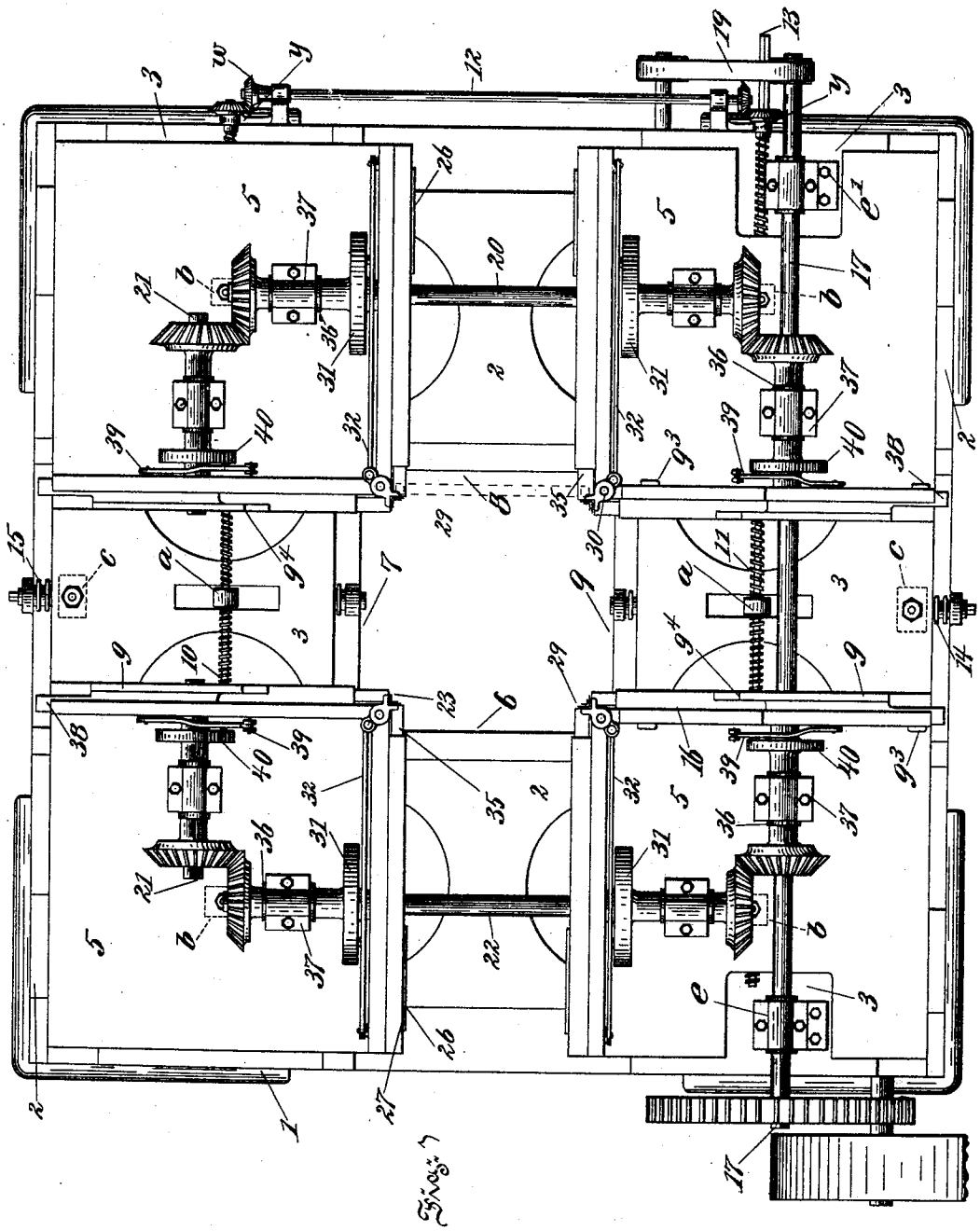
No. 771,825. PATENTED OCT. 11, 1904.

E. A. JORDAN.

BOX MACHINE.

APPLICATION FILED APR. 12, 1902. RENEWED MAR. 9, 1904.

NO MODEL. 5 SHEETS—SHEET 1.



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NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.

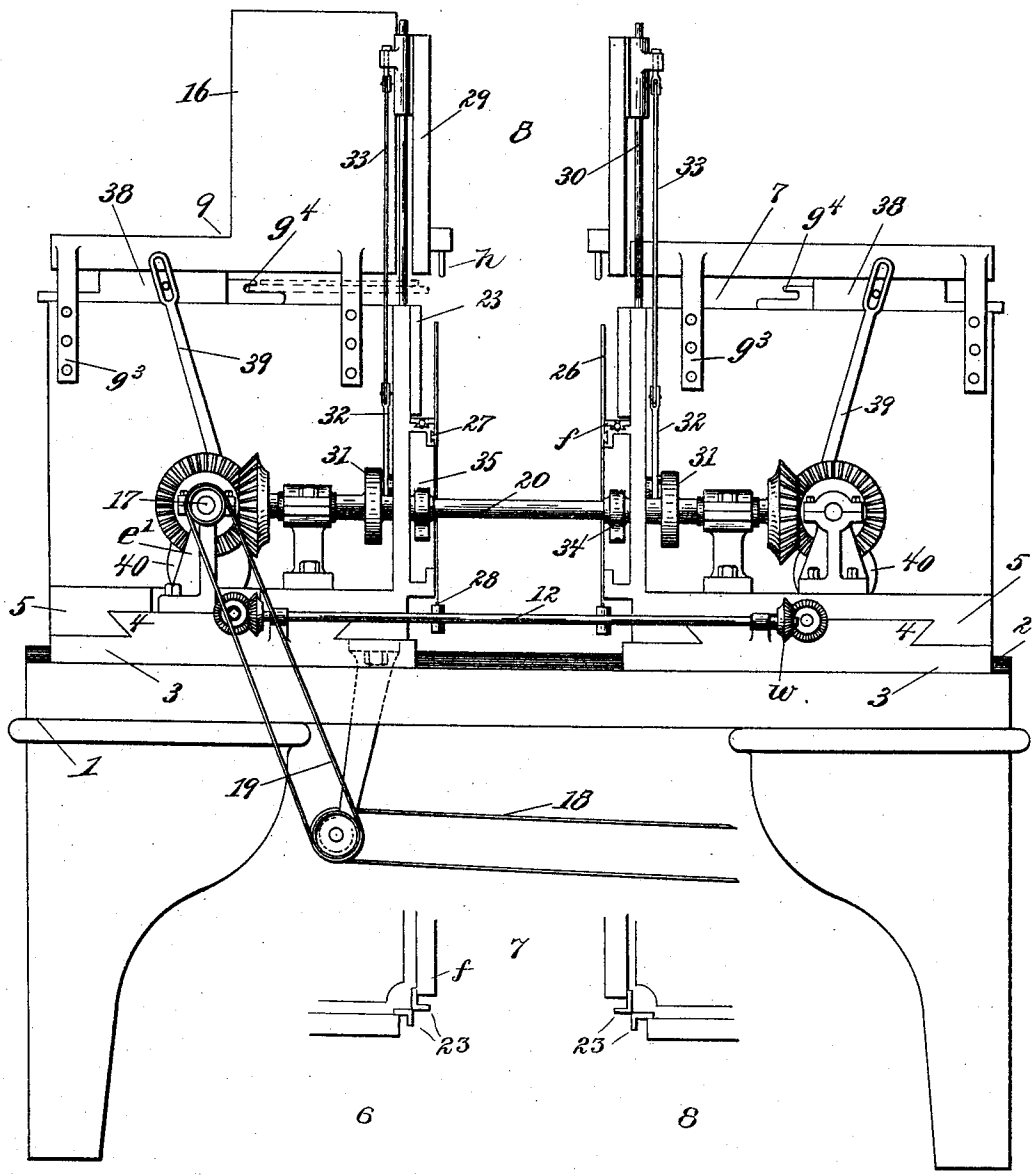


Fig. 12.

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No. 771,825. PATENTED OCT. 11, 1904.

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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3

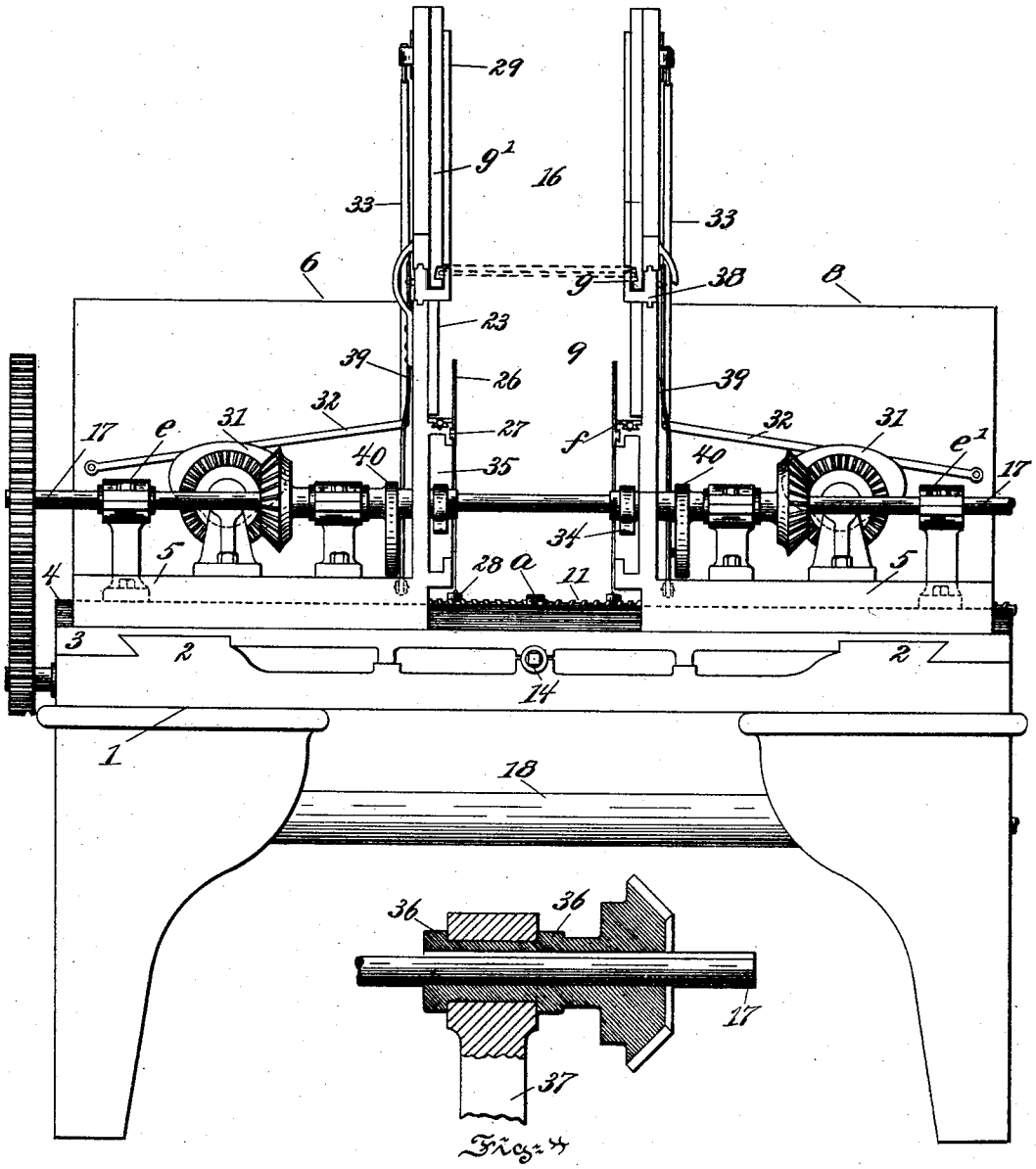


Fig. 4

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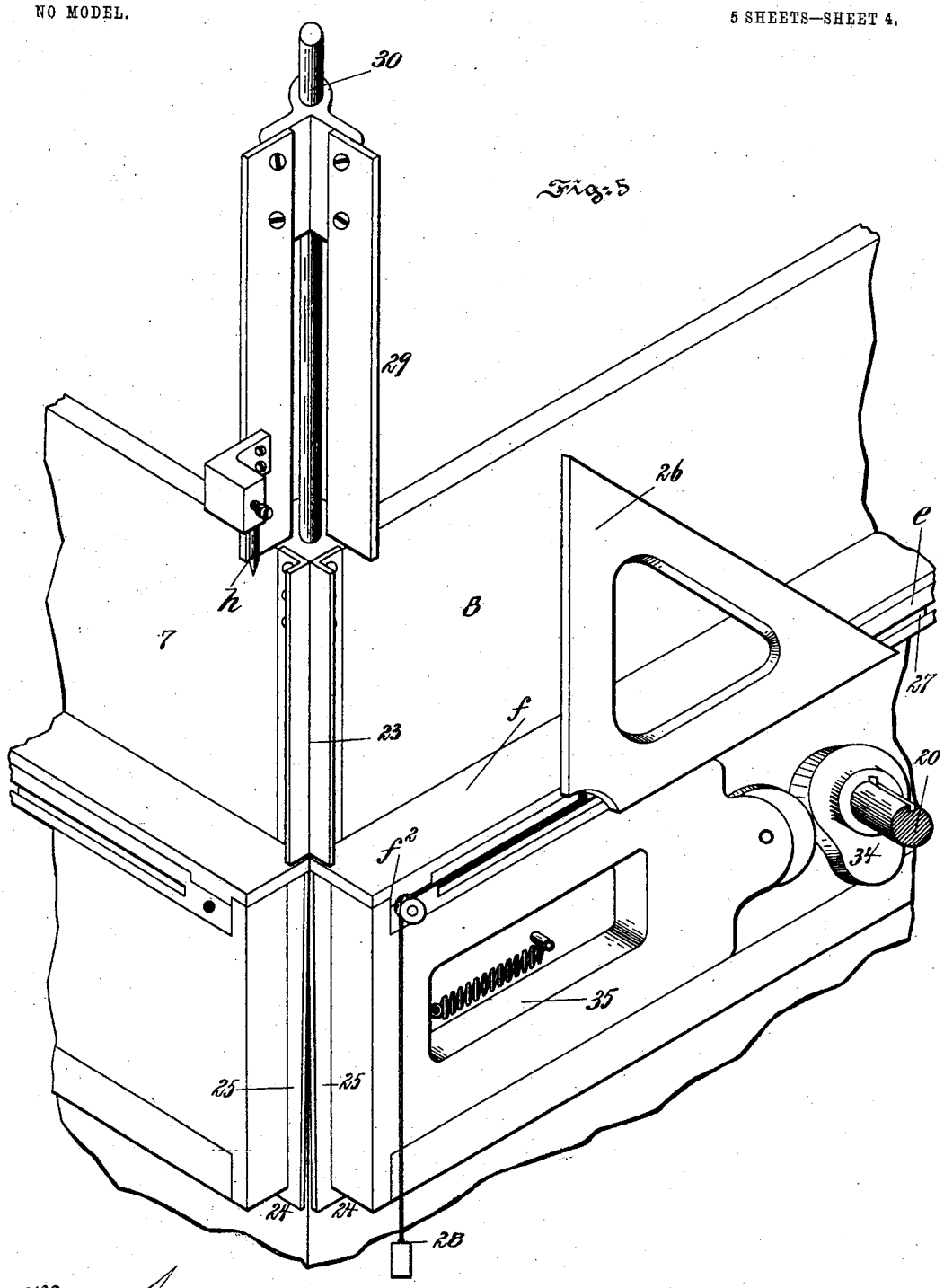
E. A. JORDAN.

BOX MACHINE.

APPLICATION FILED APR. 12, 1902. RENEWED MAR. 9, 1904.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 5



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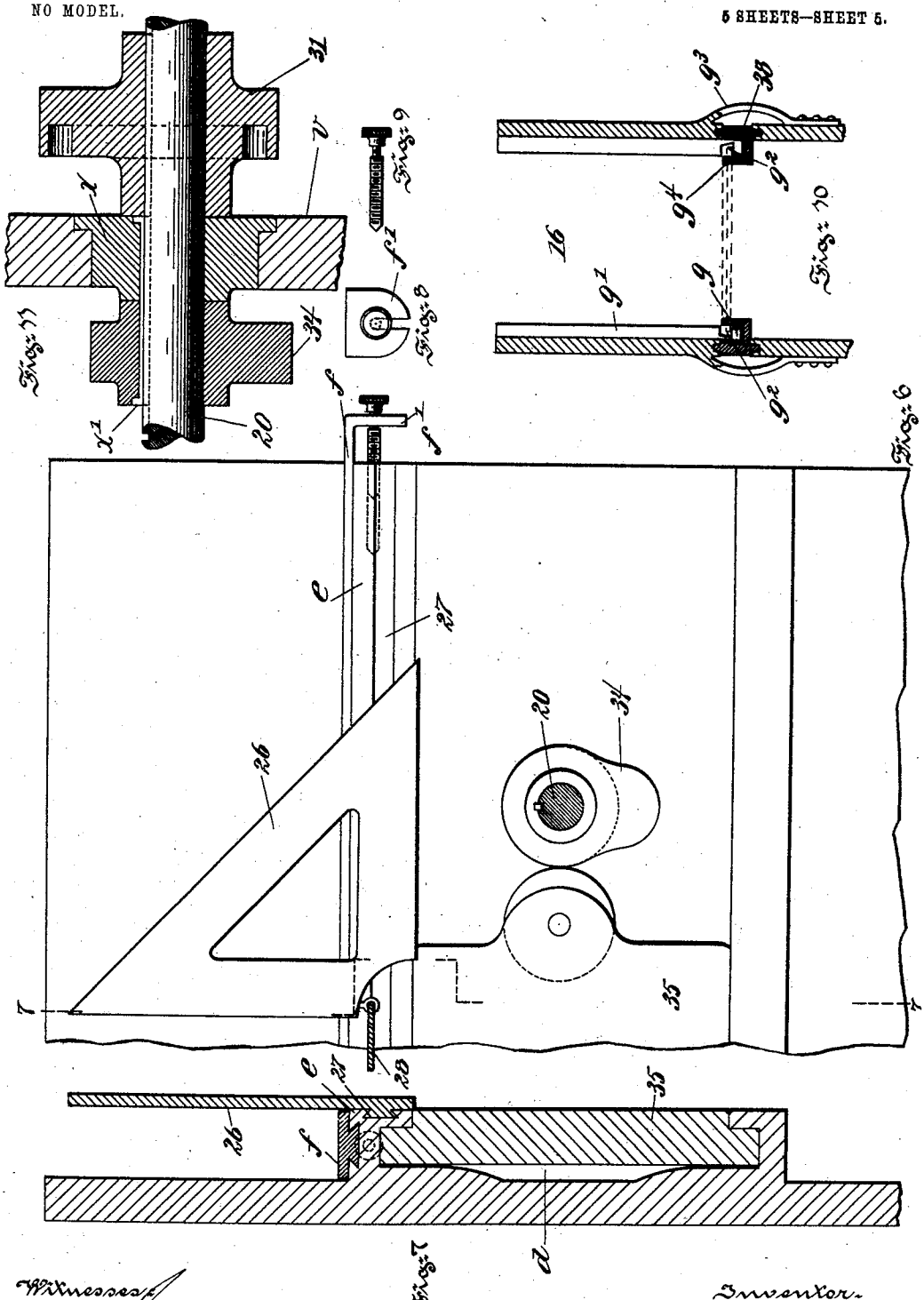
No. 771,825. PATENTED OCT. 11, 1904.

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BOX MACHINE.

APPLICATION FILED APR. 12, 1902. RENEWED MAR. 9, 1904.

NO MODEL. 5 SHEETS—SHEET 5.



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No. 771,825. Patented October 11, 1904.

UNITED STATES PATENT OFFICE.

EDWARD A. JORDAN, OF PHILADELPHIA, PENNSYLVANIA.

BOX-MACHINE.

SPECIFICATION forming part of Letters Patent No. 771,825, dated October 11, 1904.

Application filed April 12, 1902. Renewed March 9, 1904. Serial No. 197,306. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. JORDAN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Box-Machines, of which the following is a specification.

One object of the present invention is to provide a simple, reliable, and efficient machine for automatically assembling and pressing together the tongued or grooved pieces that go to make up the sides and ends of boxes.

Another object of the invention is to provide such a machine with means for positioning the bottoms of the boxes in such a way that they are engaged by the sides and ends as the latter are assembled.

Another object of the invention is to provide efficient and reliable means for operating the various parts of the machine and for guiding and positioning the parts of the box.

Another object of the invention is to provide a machine of the class described which can be readily made to accommodate itself to the manufacture of boxes of different sizes.

To these and other ends hereinafter set forth the invention comprises the improvements to be presently described and claimed.

The nature, characteristic features, and scope of the invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a top or plan view of the machine. Fig. 2 is an elevation of the end of the machine shown toward the right in Fig. 1. Fig. 3 is an elevation of the machine shown at the front in Fig. 1. Fig. 4 is a sectional view illustrating a detail of construction. Fig. 5 is a perspective view drawn to an enlarged scale and illustrating portions of the machine hereinafter referred to. Fig. 6 is an elevation showing certain of the parts illustrated in Fig. 5. Fig. 7 is a sectional view taken on the line 7 7 of Fig. 6. Fig. 8 is an end view of the adjustable parts shown in Fig. 6. Fig. 9 is a side view of the screw shown in Fig. 8. Fig. 10 is a sectional view taken through the hopper at the top of the machine. Fig. 11 is a sectional view illustrating a detail of construction, and Fig. 12 is a diagrammatic view illustrating in plan features of construction also illustrated in Fig. 5.

Referring to the drawings, there is a base or frame 1, which is shown as rectangular and mounted upon legs, but which may be variously constructed. Upon the top of this frame are ways 2, which are shown as undercut, and upon these ways are mounted traveling bases 3, of which there are two. These traveling bases 3 are in turn respectively provided with ways 4, and on these ways are arranged to slide movable bases 5, of which there are four. The purpose of these movable bases is to permit of the adjustment of the machine for the manufacture of boxes of different sizes, it being understood that the boxes are assembled and made at the center of the machine.

6, 7, 8, and 9 are hoppers which contain the side and end pieces of the box. The latter will be assumed to be placed in them edgewise, but, if desired, they might be placed flatwise and subsequently turned up on edge. They are on edge—that is, they stand vertically—when they are operated upon by the machine, and at the right-hand side of Fig. 1 I have indicated in dotted lines the position of a board. To adjust the size of the hoppers 7 and 9, screws 10 and 11 are provided, and they may be coupled together, as by a shaft 12, and suitable miter-gears held in engagement by bearings *y*, as shown in Fig. 1, and of which one, *w*, is splined to the shaft 12—for example, in the manner shown in Fig 4 and hereinafter described. By applying a crank, as to the squared shaft 13, and turning it both screws 10 and 11 are turned alike, and they operate to shift the movable bases 5 on the ways 4. The opposite ends of the screws 10 and 11 are right and left handed, and they are held, as by collars *a*, at their centers, so as to turn but not move endwise, and they engage nuts *b*, depending from the parts 5. To adjust the hoppers 6 and 8, screws 14 and 15 are provided, and they serve to shift the traveling bases 3 in respect to the ways 2 on the base 1. These

screws engage nuts *e*, depending from the parts 3. Obviously the screw 14 might be dispensed with and the necessary adjustment obtained by means of the screw 15. The spline connection at *w* accommodates this movement.

Toward the front of the machine, as illustrated in Fig. 1, and mounted above the hopper 9 and upon its walls is another hopper, 16, Fig. 2, which is used when the machine is intended to apply the bottoms of the boxes.

There is a driving-shaft 17, suitably journaled, and power is applied to it in any appropriate manner. This shaft 17 serves to operate a conveyer 18 by way of the belt 19 and its pulleys. The purpose of the conveyer is to remove the finished boxes. The shaft 17 is also geared, by means of beveled or miter gears, with counter-shafts 20, 21, and 22, all geared together and arranged around in the form of a square and mounted to turn in bearings carried by the movable bases 5, except the bearings *e* and *e'*, which are carried by the traveling bases 3. The shaft 21 is made in two parts to accommodate the described adjustment of the machine. These counter-shafts afford power for operating the feeding devices of the various hoppers, as well as the plungers, which serve to press the sides and ends together and also onto the bottom when the machine is fitted to apply the latter.

At the adjacent corners of the bases 5 there are arranged right-angle guides 23, Fig. 5, up to which the box sides and ends are fed and which serve to properly position them. Beneath these right-angle guides, Fig. 5, are right-angle pocket-guides 24. The arrangement of the guides 23 and 24 is such that a pair of boards abutting upon the guide 23 can be pushed down clear of the guide 23, which is, as it were, between the boards, in such a way that it (the pair of boards) comes into the pocket-guide 24, which lies outside of the abutting pair of boards, and the guide 24 is fitted with suitable springs 25, which serve to hold the boards against dropping through the machine until after they have been pressed together, as will be presently described. It will be understood that the side and end boards are provided at their ends with tongues that project endwise and are fitted together, the tongues on one piece fitting between the tongues on the other piece. When a bottom board is used, the side and end boards are fitted with a groove parallel with and a short distance from one of their edges, and into this groove takes a projection that extends from and all around the bottom board. When the stack of boards is put edgewise into a pocket, the feeder 26, or rather the pair of feeders, one on each side of the hopper and movable in ways 27, is pulled back of the pile, and the feeders are solicited or drawn toward the center of the machine, as by cords and weights 28, so that the feeders 26 operate to push the board nearest the center of the machine up to and against the right-angle guide 23. Of course since each hopper is fitted with feeders 26 it follows that four boards or box side and end pieces are always presented and held up to the four guides 23. There are four pushers 29, afforded vertical movement, as on rods or guides 30, one pusher being operatively arranged in respect to each guide 23.

31 represents cams on the counter-shafts 20 and 22, which operate suitable cam-levers 32, that operate through the intervention of links 33 to shift the pushers up and down. The pushers 29 are bifurcated or otherwise arranged to straddle the angle-guides 23, and thus in their descent they operate to push the side and end pieces down into the pocket-guides 24 in the manner that has been described, it being understood that the pieces when so pushed down are held in such position by the springs 25. The shafts are fitted with cams 34, Fig. 5, of which eight are shown, and which coöperate with the plungers 35. The latter are fitted to ways in the sides of the hoppers and are shown as provided with springs which hold them up to proper position in respect to their cams. Since there are plungers and their actuating mechanism for each hopper, in the present instance two for each hopper, it is obvious that when the plungers all advance toward the center of the machine they operate to drive the tongues and grooves on the ends of the box-boards home, and in that way serve to unite the sides and ends of the boxes. By referring to Fig. 7, more particularly at *d*, it will be understood that the ways for the plungers are set out somewhat from the general plane of the sides of the hoppers, so that there is room afforded for the springs 25, and so that the plungers do not operate at the extreme ends of the boards, but do operate a little distance from their ends and sufficiently far to clear the tongues which may come through the grooves or slots in the board which the plunger is pushing. In this way danger of splitting is obviated, and the sides and ends may be pressed together without danger of breaking. The part *e* is provided with ways for the parts 26 and for the adjustment-strips *f*. The latter are fitted at their back ends with yokes *f'*, Figs. 6 and 8, which take into grooves in the shanks of screws that engage tapped holes in the ends of the walls of the hoppers. By adjusting these screws the strips *f* can be shifted and their front ends, Fig. 5, brought into proper position for accommodating boards of different thickness. By reference to Fig. 5 it will be observed that the heads of the plungers extend above and below the ways in which they slide and that a part f^2 on the strips *f* engages the head of the plunger, and thus limits its backward travel.

In adjusting the movable and traveling bases it is obvious that provision must be made to insure proper engagement of the various

miter-gears which serve to connect the various counter-shafts. This can be accomplished by the arrangement shown in Fig. 4, in which one of the various pairs of miter-gears is shown, and it is provided with a hub having collars 36, which lie at the ends of the bearing 37. Four arrangements of this kind are indicated at 37 on Fig. 1. The shaft is connected with the gear by a spline connection, so that the shaft can move endwise through the gear, but must turn with it. Since the bearing 37 as well as the bearing for the shaft which carries the wheel that intermeshes with the one shown in Fig. 4 are both rigidly connected to the same base, it follows that the wheels remain in proper meshing relation, while the shaft is free to slide endwise and accommodate the various movements which have been described as those of the various movable bases.

When bottoms are to be put in the boxes, they must be provided with tongues, and the sides must be suitably grooved for the reception of the tongues. The bottom boards are put in the hopper 16, which is provided with horizontal rails g, upon which the pile of bottom boards rests flatwise, and at the center of the machine are vertical rails g', beneath which are notches g^2. The purpose of the vertical rails is to prevent the bottom boards from leaving the hopper except one at a time, and the notches g^2 permit one bottom board at the bottom of the pile to pass out from the hopper, as will be presently described. A representation in dotted lines is made in Figs. 2, 3, and 10 of a bottom board, showing the projection which extends all around the edge of the bottom boards. Referring to Fig. 10, it will be observed that the side walls of the hopper 16 are cut apart and carried by arms g^3. Thus horizontal ways are provided in which work the carriers 38. The front end of the latter are provided with fingers g^4, Fig. 2, which engage the tongue on the bottom board, and thus as the carriers move push the bottom board of the pile outward toward the center of the machine and hold it in substantially horizontal position. The carriers or feeders 38 are operated by cam-levers 39, and the cam-levers are operated by cams 40 on the driving-shaft 17. Opposite the hopper 16 are arranged duplicate carriers or feeders, which approach the center of the machine and receive the opposite edge of the bottom board. In this way the bottom board is properly positioned and held horizontally. While thus held, spurs h, Fig. 5, on the pushers 29 engage the bottom board and hold it while the feeders or carriers 38 are drawn away from the center of the machine. In descending the pushers carry the bottom board by means of the spurs h in such position that its tongued edge is engaged by the grooves in the side and end boards as they are pushed up into position by the plungers 35. The plungers in rising draw the spurs h free of the bottom board, which is then clamped by the side and end boards, the latter being held by the plungers. The movements of the various parts are so timed that the feeders 38 properly engage with and position the bottom board and remain at rest while the spurs h are pressed into it. The feeders then return to their extreme outward positions and the pushers 29 descend, carrying with them the bottom board and pushing before them the side and end boards. The plungers then move toward the middle of the machine and press the sides and ends, or rather the tongues and grooves at their ends, into engagement and at the same time press the sides and ends or the grooves in them onto the tongues of the bottom board. While these plungers are holding the parts thus pressed together the pushers rise and free the spurs h from the box. It will be understood that in the hopper 16 when the carrier reaches its extreme outward position it passes wholly from under the pile of bottom boards and on its next inward stroke takes up the bottom board of the pile in the manner described. To keep the cams in proper relation to their work and to the walls of the various hoppers when the machine is adjusted and the shafts are shifted through the cams, I may make use of the arrangement shown in Fig. 11. In that figure, v represents one of the walls of the hoppers, and it is provided with a circular bearing. In this bearing is revolubly mounted a sleeve x, which may not slip toward the left in said figure by reason of its flanged rim. The cam 34 is splined to the shaft and keyed to the sleeve x, as by the key x'. Motion of the sleeve x in the other direction is opposed by the cam 31 or 40, as the case may be, which in turn abuts upon the adjacent bearing.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth, and illustrated in the accompanying drawings; but,

Having thus described the nature and objects of the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A box-machine comprising a frame, traveling bases movable on said frame, movable bases superposed and adjustable on the traveling bases, said bases surrounding an opening through which the boxes drop, hoppers having their walls carried by said bases, and means for simultaneously shifting the bases to accommodate the opening to boxes of different sizes and the hoppers to pieces of appropriate sizes, substantially as described.

2. A box-machine comprising a frame, traveling bases, movable bases superposed on the traveling bases and adjustable in respect to

each other to form openings of different sizes, walls carried by the movable bases and constituting between them adjustable hoppers for the box side and end pieces, a hopper arranged above the first-mentioned hoppers and having its walls carried by two of the movable bases and adapted to contain bottom pieces, and means for simultaneously shifting the movable bases whereby the box-opening and all of the hoppers are simultaneously adjusted, substantially as described.

3. A box-machine comprising hoppers arranged around in a rectangle and adapted to contain box side and end pieces, means for feeding the side and end pieces edgewise from the hoppers, and devices located in a plane parallel to said means for feeding and arranged for receiving and pressing the side and end pieces together, substantially as described.

4. A box-machine comprising hoppers arranged around in a rectangle for the side and end box-pieces, means for positioning the box-bottoms in respect to feeding devices, feeding devices for arranging the box-bottoms in proper position with respect to the side and end pieces and for feeding said pieces and the bottom into another parallel plane, and pressing devices located in the last-mentioned plane for simultaneously pressing the side and end pieces into engagement with each other and with the box-bottoms, substantially as described.

5. A box-machine comprising hoppers arranged around a rectangular opening, guides arranged at the corners of the opening and having provisions for abutment with the faces of the tongue-and-grooved side and end pieces in one plane and other provisions for abutment with the ends of said pieces in another parallel plane and having a passage for permitting the pieces to be slid edgewise from one set of provisions to the other, devices for transferring the pieces edgewise from one set of provisions to the other, and means coöperating with the provisions which abut on the ends of the pieces for pressing the side and end pieces together, substantially as described.

6. In a box-machine corner-guides having right-angle guides for abutment with the faces of side and end pieces and having right-angle pocket-guides arranged in another plane and for abutment with the ends of said pieces and having a passage between the right-angle guides for permitting the pieces to be slid edgewise from one to the other, and devices for sliding the pieces edgewise, substantially as described.

7. In a box-machine corner-guides having provisions for abutment with the faces of side and end pieces in one plane and for abutment with the ends of said pieces in another parallel plane and having a passage for permitting the pieces to be slid edgewise from one set of provisions to the other, and adjustable strips having their ends arranged to vary the size of said passage to accommodate pieces of different thicknesses, substantially as described.

8. In a box-machine right-angle guides upon which the faces of side and end pieces abut, right-angle pocket-guides arranged beneath the same and upon which the ends of the pieces abut said right-angle guides being arranged with a passage through which the pieces may move edgewise, a sliding strip for adjusting the passage, and a screw for adjusting the strip, substantially as described.

9. In a box-machine yielding means for engaging the ends of the side and end pieces and sustaining the assembled pieces, and pressing devices arranged to operate on said pieces at a distance from the ends thereof, whereby the tongues on the pieces clear said pressing devices, substantially as described.

10. In a box-machine a hopper for the bottom boards, means, substantially as described, for feeding the boards flatwise one at a time from the bottom of the hopper and for supporting the same from opposite sides until they are engaged by spurs, spurs for penetrating the faces of the boards so as to hold and carry and position them, and means for actuating said parts, substantially as described.

11. In a box-machine a hopper for bottom boards provided with horizontal and vertical rails having a feeding-space between them, feeders for delivering the bottom boards one at a time from a pile and each consisting of a pair of fingers between which the tongues on the boards take, and means for actuating the feeders, substantially as described.

12. In a box-machine feeders arranged to approach and recede from each other to feed bottoms from a pile and position them, fingers on the feeders for supporting the bottoms while spurs are driven into their faces, spurs for entering the faces of the bottoms and carrying the latter, and means for actuating said parts, substantially as described.

13. A box-machine consisting of corner-guides arranged around a rectangular opening and having right-angle guides for abutment with the faces of side and end pieces in one plane and right-angle pocket-guides for abutment with the ends of said pieces in another parallel plane and having a passage for permitting the pieces to be slid edgewise from one set for right-angle guides to the other, feeders for feeding bottom boards above the side and end pieces and positioning them for engagement by spurs, vertically-reciprocating pushers adapted to slide the side and end pieces and provided with spurs for penetrating the bottom boards and carrying them into position, pressers, and actuating means for the parts, substantially as described.

14. In a box-machine movable bases arranged around a rectangular opening and carrying working parts, means for shifting said bases to adjust the machine, shafts adapted to operate said parts and arranged at right

angles to each other, bearings on the bases for the shafts, intermeshing bevel-gears whereof one is splined to one of said shafts and is provided with a collar and whereof the other is fast to the other of said shafts, and a bearing engaging said collar whereby the splined shaft may slip through its bevel-gear upon movement of the base and while the gears remain in mesh, substantially as described.

In testimony whereof I have hereunto signed my name.

EDWARD A. JORDAN.

In presence of—

W. J. JACKSON,

K. M. GILLIGAN.