

(No Model.)

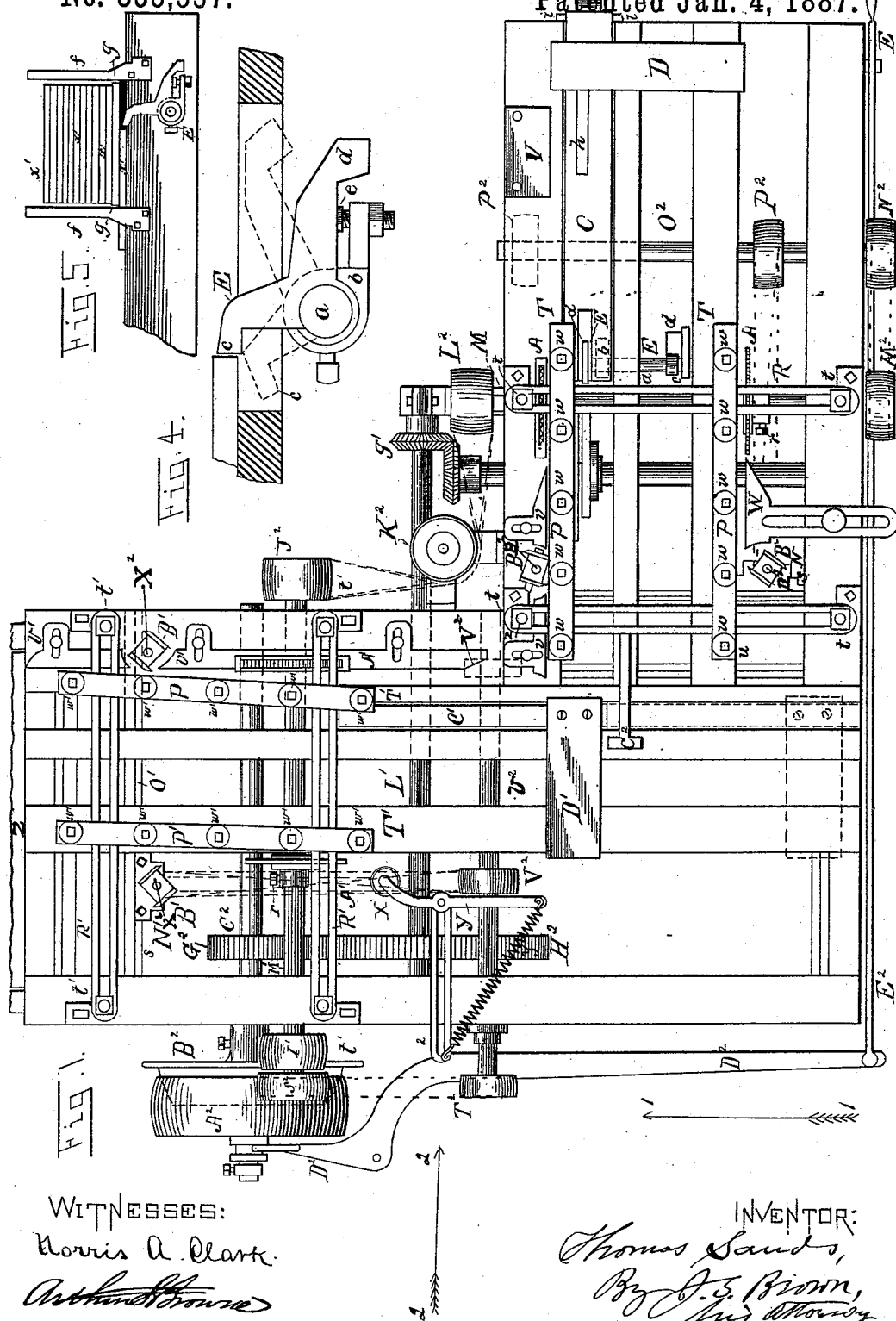
3 Sheets—Sheet 1.

T. SANDS.

MACHINE FOR MAKING BOX STUFF.

No. 355,557.

Patented Jan. 4, 1887.



WITNESSES:

Morris A. Clark.

Arthur Brown

INVENTOR:

Thomas Sands,
By J. E. Brown,
his attorney.

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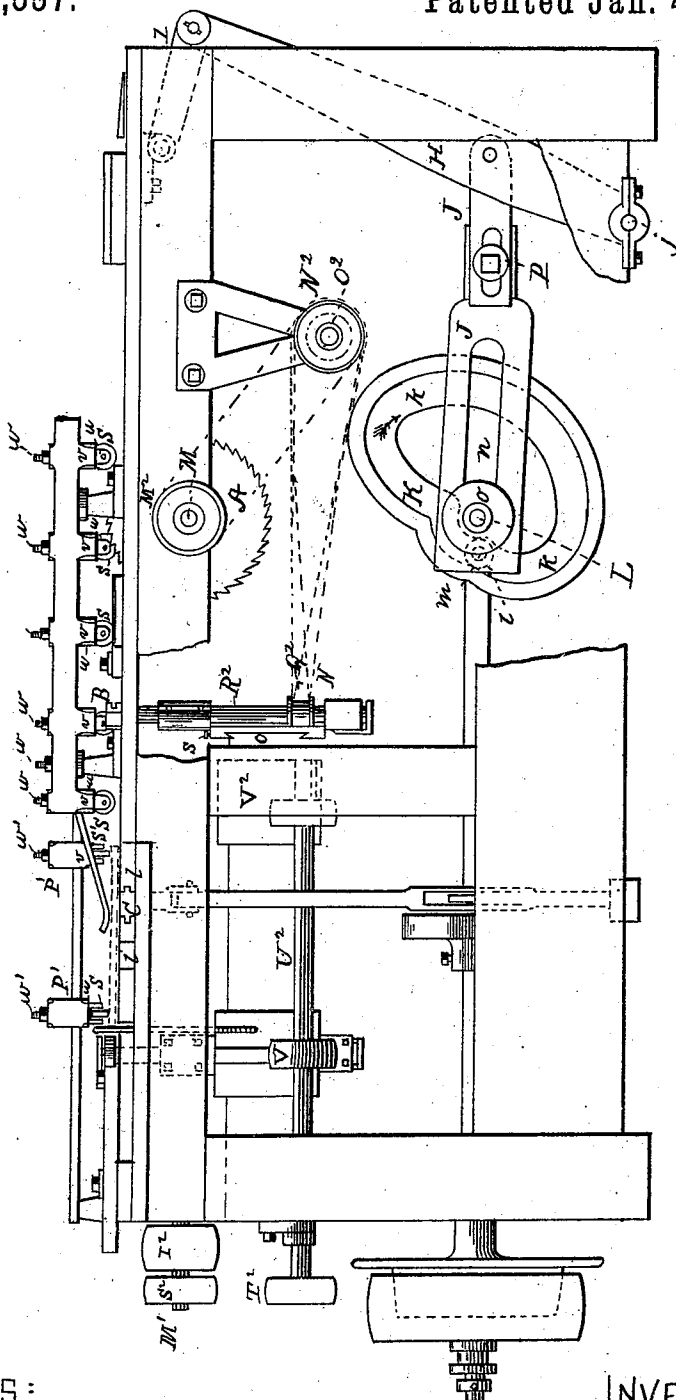
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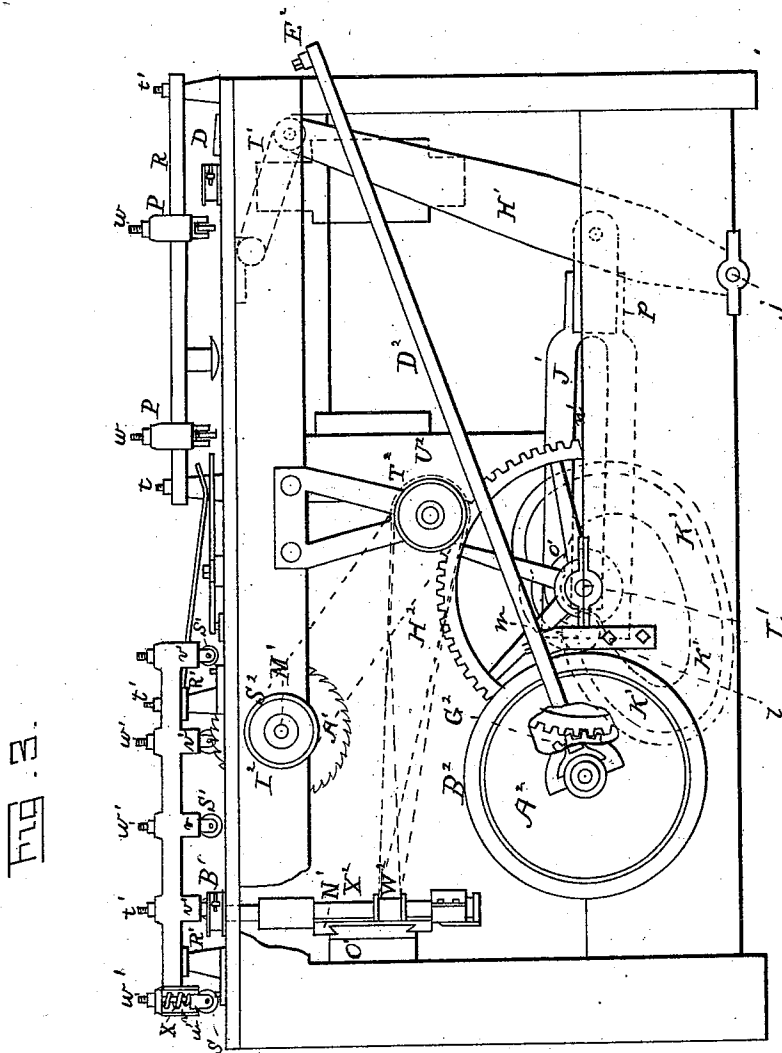
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UNITED STATES PATENT OFFICE.

THOMAS SANDS, OF NASHUA, NEW HAMPSHIRE.

MACHINE FOR MAKING BOX-STUFF.

SPECIFICATION forming part of Letters Patent No. 355,557, dated January 4, 1887.

Application filed December 26, 1885. Serial No. 158,790. (No model.)

To all whom it may concern:

Be it known that I, THOMAS SANDS, of Nashua, in the county of Hillsborough and State of New Hampshire, have invented new and Improved Machinery for Making Finished Shooks for Boxes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention consists of machinery or apparatus by which the parts of boxes—that is, the sides, ends, bottom, and top—composing a shook for each box are accurately cut to the proper length and width, and all the edges of each piece are trimmed smooth and exact, so that after planing the sides or the outsides of the pieces they will, when nailed together, form boxes perfect in shape and finish without further manipulation.

Preparatory to the operations of this invention the stock is prepared in the usual manner by tonguing and grooving and matching together the boards as far as necessary to obtain the requisite widths of the pieces, and roughly cutting the pieces into the proper dimensions for use. This may be done with entirely separate machinery, or such machinery may at least in part be directly connected with the finishing machinery constituting my invention; but in the following specification I shall assume that the pieces have been roughly cut to dimension by separate machinery.

In the accompanying drawings, Figure 1 represents a top view of the combined machinery constituting my invention; Fig. 2, a side view of the same, looking in the direction of the arrow 1 1, Fig. 1; Fig. 3, a side view thereof, looking in the direction of the arrow 2 2, Fig. 1; Fig. 4, a side view, on an enlarged scale, of a portion of the feeding mechanism detached; Fig. 5, a view of a special construction of the feed apparatus.

Like letters designate corresponding parts in all of the figures.

The principal features of my invention are, first, the combination of the end edge-trimming mechanism and side edge-trimming mechanism arranged in such relation to each other that the pieces are fed through one mechanism for trimming and finishing their end edges, and then automatically taken by the

side edge-trimming mechanism and fed along in a direction at right angles or transverse to the direction of the feed of the former mechanism for trimming and finishing their side edges; second, the combination of the operative parts of the two mechanisms, whereby the two mechanisms operate in complete harmony with each other, and the timing of the said parts of the same is made accurate and in exact accord in both mechanisms; third, the combination of the feed devices, by which successive pieces are fed along by stages following one another at proper intervals and in the proper directions in harmony with the operations of the several forming and finishing instruments employed for doing the work. Subordinate features of improvement will be specified hereinafter.

The relative arrangement of the parts composing the organization, as illustrated in the drawings, is most fully and clearly represented in Fig. 1, which shows a top view of the entire apparatus. In this view the end edge trimming and finishing devices are shown at the right hand, and the side edge trimming and finishing devices are shown at the left hand. The feed movement of the pieces through the first-named part of the machinery is from right to left, and the feed movement of the second-named part thereof is forward in the line of view.

The functional operations upon the pieces as they are passed through the entire apparatus are effected by the following instruments: First, the two ends of each piece are trimmed to the exact length required by two crosscutting-saws, A A, between which the piece is driven; second, these ends are smoothed and finished by two cutter-heads, B B, or their equivalents, between which the piece is next carried; third, the piece then moving in a direction at right angles or transverse to the preceding movement thereof has its side edges trimmed by one or two slitting-saws, A' A', between which the piece is moved ordinarily, one saw being sufficient; fourth, these side edges are then smoothed and finished by two cutter-heads, B' B', between which the piece is carried and then discharged from the apparatus.

It may be here stated that the double organization herein set forth is for the purpose

of performing the operations more rapidly, more economically, with more automatic movements, and with less cost of attendance. As to this feature of my invention, therefore, this organization is essential. As to other features of my invention, however, this is not essential. Thus, in brief explanation, it may be here stated that the end edge trimming and smoothing devices and the side edge trimming and smoothing devices may form two separate machines, to which the pieces are fed separately and successively, instead of the apparatus or combination of machinery herein illustrated and described.

I will next proceed to set forth the means or devices by which the pieces are successively fed from one pair of operative instruments to another in succession.

First, a reciprocating carriage, C, carries the pieces to the operative parts A A and B B for trimming and finishing the end edges thereof, and a reciprocating carriage, C', takes the pieces successively from the position in which they are left by the first carriage and carries them to the operative parts A' A' and B' B', for trimming and finishing the side edges thereof. The latter carriage also expels the pieces from the machine. A downwardly-pressing spring, C'', Fig. 1, is generally employed to hold the pieces in place where left by the carriage C until they are taken by the carriage C'.

A special feature of the reciprocating carriage C is the construction by which it makes a double feed movement. Thus its rear part, upon which the pieces are first placed, is provided with a means, as the shoulder-bar or driver-rest D, by which the pieces are moved forward a distance equal to the extent of its reciprocating movement, and then, after its return reciprocation, a means, as the driver dog or dogs E E, at its forward end, takes the pieces where left by the first driver, D, and moves them forward again a distance equal to the extent of the carriage reciprocation. By this means not only does the feed-carriage feed the pieces twice as far as its own movement, which consequently is only one-half as great as would otherwise be required of it, but something is gained in the compactness of the machine, and the carriage is kept entirely away from the vicinity of the operative instruments. The distance to which the pieces are moved by this feed-carriage is constant and accurate, whereby the pieces are carried into the exact position required by the second feed-carriage, C', to take them and carry them to the operative instruments A' A' B' B'. This second feed-carriage may have double feed devices the same as the first feed-carriage, C; but this is not necessary, since each succeeding piece fed along may be employed to push forward the preceding piece after one feed movement of the carriage to move the piece out of the way of the preceding piece, and so on until each piece is finally expelled from the last trimming and finishing machine. To harmonize the movements of the

two feed-carriages, one is made to complete its forward movement as the other completes its backward reciprocation.

When work is commenced, the first feed-carrier, C, is supposed to be at the rear termination of its reciprocating movement, and the second feed-carrier at the forward termination of its reciprocating movement, or thereabout, the position shown in Fig. 1. The first forward movement of the carriage C carries the first piece forward by its rear driver, D, while its forward driver, E, is empty; but at the second forward movement the forward driver, E, takes the piece left by the rear driver after the preceding forward movement, and the rear driver takes a second piece and moves it forward. Afterward each driver carries forward a piece at each forward movement of the carriage as long as pieces are constantly supplied thereto. As the forward driver, E, carries the pieces one by one past the finishing instruments B B into the pathway of the second carriage, C', the latter just previously thereto retreats back of the position far enough not to obstruct the way of the pieces, and finally into the position indicated by dotted lines in Fig. 1. The forward movements of this carriage then feed the pieces to the instruments A' A' B' B'.

Since the pieces placed upon the first carriage, C, pass over the forward driver, E, of the carriage, or, more accurately speaking, the said driver is drawn back beneath the same during the backward motion of the carriage, and it is necessary or desirable that the pieces be not lifted from their positions thereby, I provide for depressing the driver automatically for the purpose as the carriage recedes, and for automatically raising the same again into operative position after it passes to the rear of the back piece fed forward by the rear driver, D. The device which I have adopted for the purpose is shown in position in Fig. 1, and more fully as to its operative construction in Fig. 4. Two dogs, E E, as shown, are to be located one near each rear corner of the pieces to be driven forward, though one dog placed centrally behind the pieces would less perfectly serve the purpose. The dogs are mounted on a shaft, a, the bearing b of which is bolted or otherwise secured to the under side of the carriage. The shaft a allows the required extent of turning motion to the dogs for the purpose. Each dog has the form shown, or any other suitable to its function. The upper driving end, c, of the dog, when in position for action, projects above the carriage, as shown in full lines in Fig. 4, and in this position a rear arm, d, of the dog rests on an adjustable stop, e. This arm d overbalances the weight of the other part, c, of the dog, so that the latter ordinarily rests upright and ready for action; but when the carriage recedes the part c, striking the under side of the piece, is depressed into the position shown by dotted lines in Fig. 4, and in that position slides along under the piece until it passes to

the rear of the same, when it immediately rises into position for driving the piece forward at the next forward movement of the carriage.

I have shown in Figs. 1 and 2 for the rear driver, D, a simple cross-bar attached to the carriage. When the box-pieces are simply supplied to the carriage one by one by an attendant, this simple construction is operative and sufficient, and such a driver, obviously, is all that is required for the second carriage, C', as represented at D'; but for the first feeding into the apparatus an automatic feed is desirable, so that the pieces may be supplied in quantity thereto, and the constant presence of the attendant is not necessary. I have shown in Fig. 5 such an automatic feed device.

Over the rear end of the carriage C is located a feed-box, G, which may be composed simply of four posts, *ffff*, attached to the side timbers of the machine, and vertical cross-boards *gg*, extending transversely between the two front and two rear posts, respectively. The distance between the boards is sufficient to receive the greatest width of pieces *x' x'* placed in the box. There is sufficient depth of space beneath the front board for one thickness of piece to pass forward beneath it, but not for two pieces, so that only one piece can be fed out of the box at a time.

For a driver the same construction as above described, consisting of dogs E', operating in the same way, is preferably employed, one of the dogs reaching up through the slot *h* in the carriage C. (Shown in Fig. 1.)

Fig. 5 indicates how the dogs drive forward the lowest piece piled into the box at each forward movement of the carriage, and then the dogs drop beneath the pile as the carriage recedes to get to the rear of the next piece, which drops into the position of the previous piece driven out. A considerable number of pieces may be placed in the feed-box at once.

The feed-carriages C C' slide in suitable guide-ways, *ii*, as shown, or in any other suitable manner.

For imparting the reciprocating movement to each feed-carriage I have made an improved device, represented most clearly in Fig. 2. A vibratory lever, H, is connected by a rod, I, with the carriage at its upper end, and pivoted at *j* to a fixed support at its lower end. A connecting-bar, J, is pivoted to the lever at the proper distance above the pivot *j*, and extends to a revolving cam, K, in the cam-groove *k*, of which a friction pulley or sleeve, *l*, turning on a pivot-pin, *m*, of the connecting-bar, runs as the cam is rotated. The cam-groove has the proper eccentricity and form to give the requisite and proper movement to the carriage. To keep the connecting-bar J in central or proper position in relation to the cam, it has a longitudinal slot, *n*, of sufficient width and length to straddle the shaft L of the cam, as shown, and a washer disk or plate, *o*, on the said shaft, bearing against the outer side of the connecting-bar, serves to hold the same to the cam. The connecting-bar may be made in

two parts, as shown in Fig. 2, with an adjustable connection, *p*, for adjusting its length to suit the required position of the lever H and the carriage. A similar construction for reciprocating the feed-carriage C' is employed, as shown in Fig. 3, corresponding letters, marked "prime," being used to designate the several parts thereof, as on the device for moving the carriage C. In order that these two carriage-operating devices shall be correctly timed together as required for the proper feed movements, the two shafts L L' of the respective cams, K K', are geared together by gear-wheels *q q'*, so that they will revolve at precisely equal speed.

Since the pieces to be trimmed and smoothed vary in length and width, and the opposite edges thereof are to be operated upon at the same time, it is requisite that the trimming-saws and finishing heads or cutters shall be adjustable in distance, those on one side from those on the other side. For this purpose all the saws and cutter-heads on one side are stationary and those on the other side are made adjustable toward or from them. Thus one of the saws A A' is adjustable toward and from the other saw on the same shaft, M, and secured in place by a set-screw, *r*, or its equivalent. In the same manner one of the saws A' A' is adjustable on the shaft M' and secured in place by a set-screw, *r'*, or its equivalent. Also, one of the cutting or finishing heads B B' is mounted in a bearing-block, N, which slides transversely of the machine upon the ways of a cross-beam, O, of the machine, and is secured in position by a set screw or screws, *s*, or its equivalent, as shown in Fig. 2. The bearing-block of the other finishing-head may likewise be adjustable to give it accurate position. In like manner the bearing-block N' of one of the finishing-heads B' B' is adjustable on a transverse beam, O', and secured in position by a set screw or screws, *s'*, as shown in Fig. 3.

It may be here remarked that the finishing-heads B B' B' B' may be cutters for ordinary soft materials, or sand-paper or other equivalent smoothers for harder woods. In short, I do not confine myself to any special construction of the smoothers or finishers.

In connection with the trimming-saws and finishing-heads a series of pressure-bars, P P P' P', are employed to hold down the pieces and also to guide them as they are moved along by the feeding carriages. These are arranged in pairs, so as to hold the two opposite edges of the pieces which are being operated upon. One pressure-bar of each pair is also adjustable to and from the other to correspond with the adjustments of the trimming and finishing instruments. I have devised the following construction for these pressure-bars and their adjustment: The said pressure-bars being arranged in position parallel with the line of feed motion given to the pieces, or nearly so, each pair of bars, P P and P' P', respectively, are mounted on two cross-bars, R R and R' R'.

These cross-bars are secured at their ends firmly upon side beams of the frame-work of the apparatus, as shown, or otherwise; and they are slotted or constructed in an equivalent way, whereby the pressure-bars may be secured to them in any position required. Screw-bolts $t t$ and $t' t'$ extend upward through the slots of the cross-bars and holes in the pressure-bars and are secured by nuts, whereby the pressure-bars are firmly held in any position required.

The pressure-bars have pressure-rolls $S S$ and $S' S'$ beneath them arranged to turn in planes parallel with the lines of feed motion, so that they will roll freely upon the pieces fed beneath them. These pressure-rolls are pressed elastically downward upon the pieces with adjustable pressure. This may properly be effected by means shown in the drawings. The bearings $u u$ and $u' u'$ in which they are mounted are square, or otherwise formed, to prevent their turning out of position, and they slide up and down in boxes $v v$ and $v' v'$ of the pressure-bars, as seen most clearly in the partial section at the left hand in Fig. 3. Guide-bolts $w w$ and $w' w'$ also extend from the roll-bearings up through the tops of the boxes, around which bolts are coiled springs x . The upper ends of the guide-bolts are screw-threaded and provided with nuts, by which the force of the springs may be adjusted at will.

In connection with the pressure-bars supporting bed-beams $T T$ and $T' T'$ are used for the pieces to rest upon. A supporting-beam is located under each pressure-bar, and therefore each beam under an adjustable pressure-bar is adjustable laterally to correspond in position therewith. Also, in connection with the trimming and finishing instruments, guides U and $U' U'$ are used—one between each stationary trimming-saw and the finishing-head behind it, and one behind each stationary finishing-head—as shown in Fig. 1. A feed-guide, V , is located at one side, at the position where the pieces are first fed to the machine, to start the pieces in the right position for the first trimming-saw A . There may also be an adjustable guide, W , between the adjustable saw and the adjustable finishing-head, as shown between such instruments $A B$ in Fig. 1; but another means of holding the pieces to the stationary instruments and their guides is shown in connection with the side edge trimming and finishing instruments. First, there is a horizontally-moving pressure-roll, X , mounted on a swinging lever, Y , and this roll is pressed toward the pieces as they are being fed toward the said trimming and finishing instruments by a spring, y , stretched by an adjustable holder, z . This roll brings the pieces properly to the working instruments, and the pieces are held to the instruments and their guides by the pressure-bars $P P'$ being placed slightly oblique to the line of feed motion, as shown clearly in Fig. 1. The effect is obvious.

In applying the driving power to this ma-

chinery the feed mechanism is actuated by means entirely separate from the mechanism employed to operate the functional parts of the machines, so that the feed may be entirely under control, and stopped and started without disturbing the said functional operations. Thus, for operating the feed mechanism, a belt from the power-shaft turns a driving-pulley, A^2 , which is clutched to and unclutched from a conical clutch-disk, B^2 , on a counter-shaft, C^2 . A clutch-operating lever, D^2 , is connected with the said pulley, and a connecting-rod, E^2 , extends from the lever to a position to be reached by the attendant standing where the pieces are fed to the apparatus, as clearly shown in Fig. 1. A gear-wheel, G^2 , on the said counter-shaft gears into a gear-wheel, H^2 , which gears with the other cam-shaft, L' , which two shafts actuate the entire feed mechanism. The two gear-wheels G^2 and H^2 are so proportioned in size as to obtain the requisite speed of the feed movements. Then, as to the mechanism for driving the trimming and finishing instruments, a belt passes from the power-shaft to a pulley, I^2 , on the shaft M' of the trimming-saws $A' A'$, and a belt passes from a pulley, J^2 , on the other end of the same shaft around an idler-pulley, K^2 , to change the direction of the motion, and then around a pulley, L^2 , on the saw-shaft M . The two finishing-heads $B B$ are rotated by a belt passing from a pulley, M^2 , on the saw-shaft M to a pulley, N^2 , on a counter-shaft, O^2 , and by belts respectively passing from pulleys $P^2 P^2$ on the said counter-shaft to pulleys Q^2 on the respective shafts R^2 of the said finishing-heads. One of the pulleys $P^2 P^2$ is adjustable on the shaft O^2 to conform its position to that of the adjustable finishing-heads. Similarly the finishing-heads $B' B'$ are rotated by a belt passing from a pulley, S^2 , on the saw-shaft M' to a pulley, T^2 , on a counter-shaft, U^2 , and by belts respectively passing from pulleys $V^2 V^2$ on the said counter-shaft to pulleys W^2 on the respective shafts X^2 of the said finishing-heads, and one of the pulleys $V^2 V^2$ is adjustable on the said shaft to conform to the position of the adjustable finishing-head.

Instead of trimming and finishing the end edges of the pieces first and then the side edges, as above set forth, the operations may be reversed with substantially the same result; but it is preferable to arrange the apparatus in this respect as above described, since by finishing the end edges first there is no danger of splintering the edges or corners of the pieces, and there is such liability by the alternative method suggested; and although I usually trim and finish the edges before planing the sides the planing might be done first; but here again there would be more liability of doing rough or imperfect work.

I claim as my invention—

1. In a machine for trimming and finishing the edges of pieces for making wooden boxes, the combination of two oppositely-arranged saws for cutting or trimming to exact

dimension two opposite edges of each piece, two oppositely-arranged cutter-heads arranged, respectively, in line with and back of the said saws for smoothly finishing the said edges, two additional oppositely-arranged saws situated back of the said cutter-heads for cutting or trimming to exact dimension the other two opposite edges of the pieces, two additional oppositely-arranged cutter-heads arranged, respectively, in line with and back of the said additional saws for smoothly finishing the edges of the pieces trimmed by the latter saws, a feed-carriage for feeding the pieces to and past the first pairs of saws and cutter-heads, and a feed-carriage for feeding the pieces to and past the second pairs of saws and cutter-heads, substantially as and for the purpose herein set forth.

2. The combination of two oppositely-arranged saws for cutting or trimming to exact dimension two opposite edges of box-pieces, two oppositely-arranged cutter-heads situated, respectively, in line with and back of the said saws for smoothly finishing the said edges, two additional oppositely-arranged saws situated back of and in positions at right angles to the first pair of saws and cutter-heads for cutting or trimming to exact dimension the other two edges of the pieces, two additional oppositely-arranged cutter-heads arranged, respectively, in line with and back of the said additional saws for smoothly finishing the edges of the pieces trimmed by the latter saws, a feed-carriage for feeding the pieces to and past the first pairs of saws and cutter-heads, and a feed-carriage for feeding the pieces to and past the second pairs of saws and cutter-heads in a direction at right angles to the movement of the first feed-carriage and adapted to receive the pieces from the same, substantially as and for the purpose herein set forth.

3. The combination of a reciprocating feed-ing-carriage, a driver attached to the rear part of the carriage, and a driver at the front part of the carriage acting successively upon the pieces of board, whereby the pieces are by the same carriage fed forward by successive steps a distance equal to double the forward movement of the carriage, for the purpose herein specified.

4. In combination with a reciprocating feed-carriage having a driver at or near its rear end, a driver at the front end of the carriage provided with tilting dogs which automatically rise at the rear of the pieces when thrust forward by the driver to move them forward and drop again as they recede beneath the pieces, for the purpose herein specified.

5. The combination of two oppositely-arranged saws for cutting or trimming to dimension two opposite edges of box-pieces, two oppositely-arranged cutter-heads situated, respectively, in line with and back of the said saws, a feed-carriage for feeding the pieces to and past the said saws and cutter-heads, and pressure bars provided with spring-pressure rolls on their under sides, located over the feed-carriage and substantially parallel therewith, substantially as and for the purpose herein specified.

6. The combination, with two shafts having the trimming-saws mounted thereon, of the finishing-heads and their shafts driven by the saw-shafts, separately-driven shafts and feed devices operated thereby at equal speeds by means of suitable connecting mechanism, and a clutch for clutching and unclutching the feeding mechanism, substantially as and for the purpose herein set forth.

THOMAS SANDS.

Witnesses:

L. F. THURBER,
F. S. SARGENT.