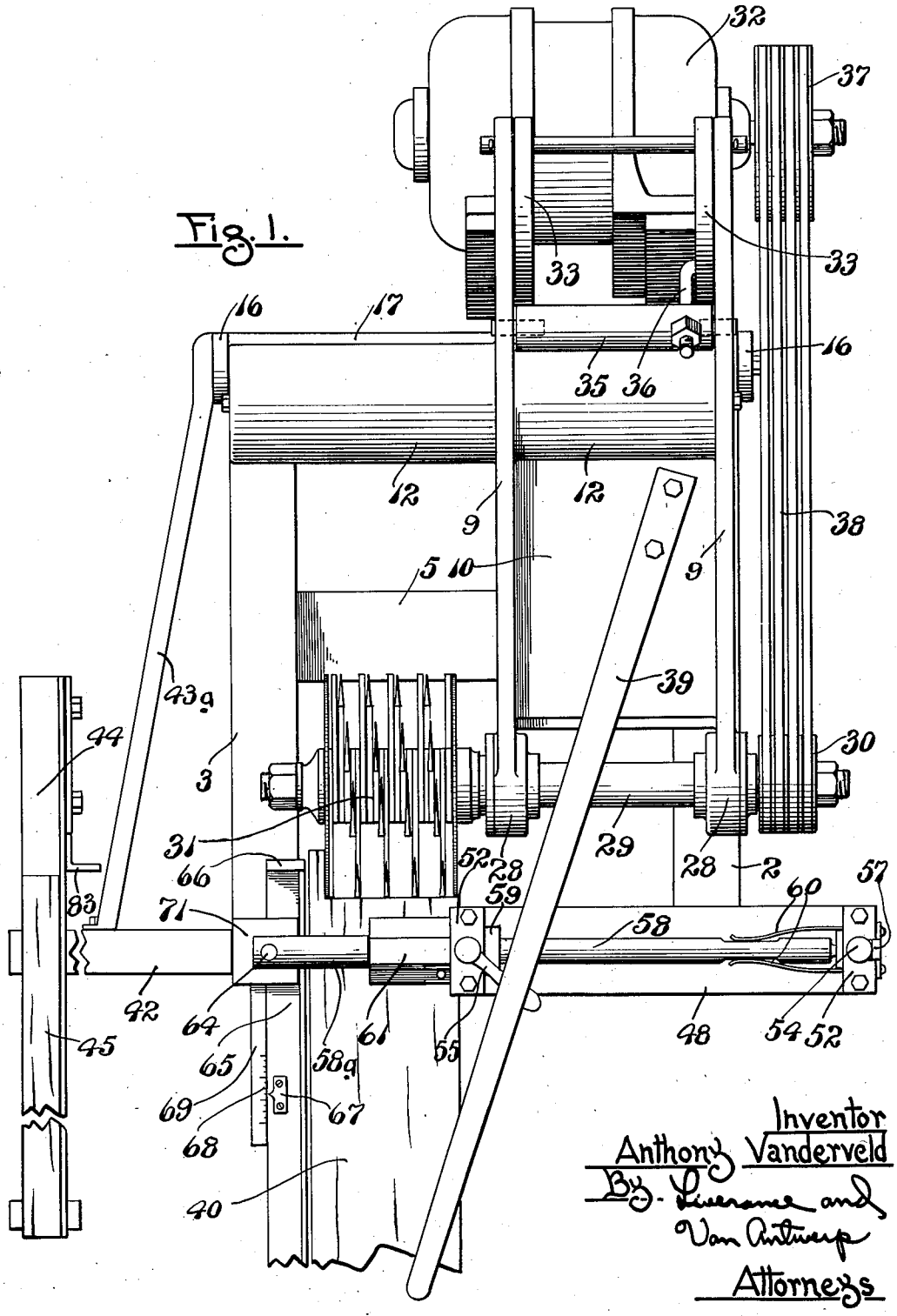
July 21, 1942. A. VANDERVELD 2,290,394

DADO MACHINE

Filed Feb. 10, 1941 5 Sheets-Sheet 1

Fig. 1.



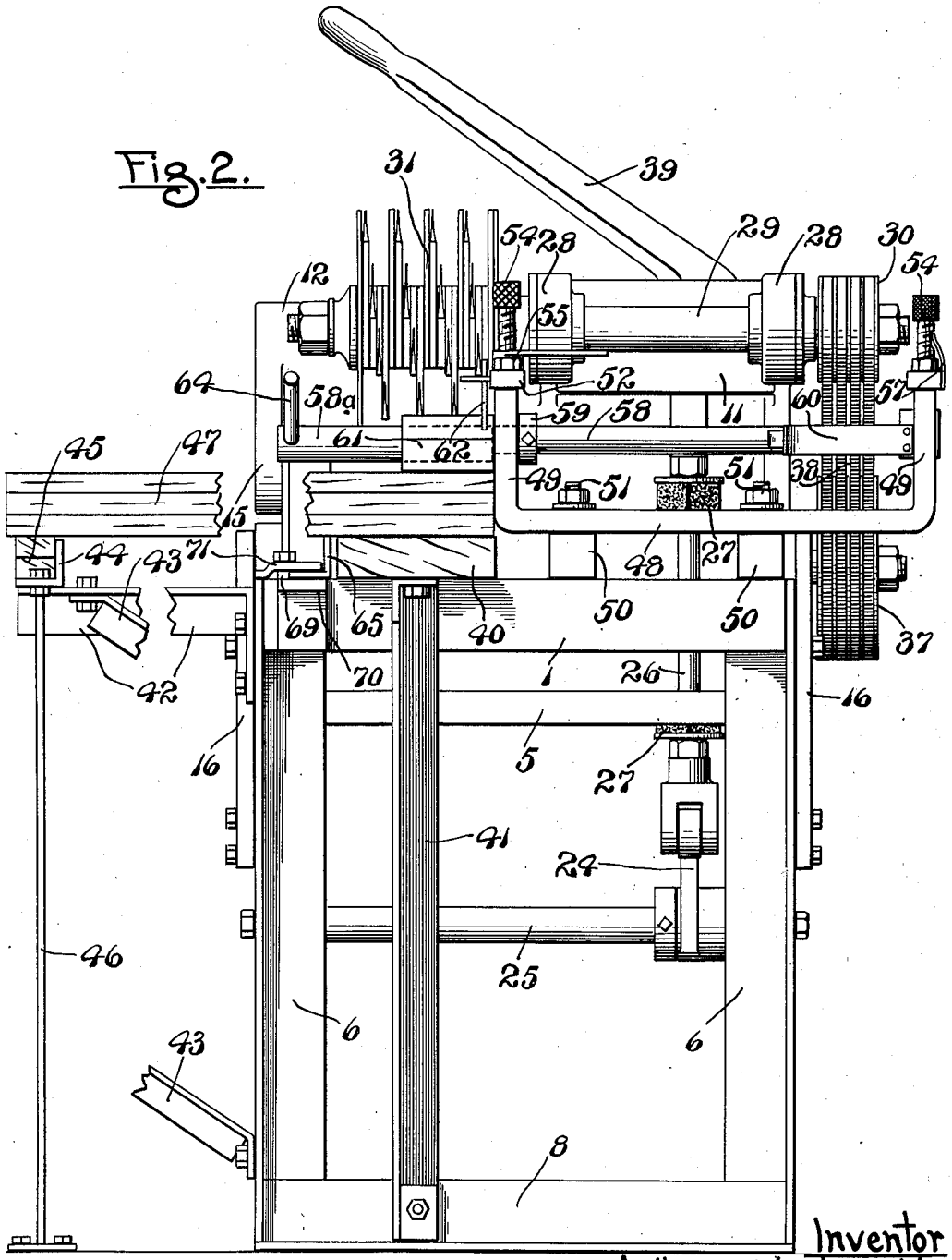
Inventor
Anthony Vanderveld
By Lawrence and Van Antwerp
Attorneys

July 21, 1942. A. VANDERVELD 2,290,394

DADO MACHINE

Filed Feb. 10, 1941 5 Sheets-Sheet 2

Fig. 2.



Inventor
Anthony Vanderveld
By Lincoln and Van Antwerp
Attorneys

July 21, 1942. A. VANDERVELD 2,290,394

DADO MACHINE

Filed Feb. 10, 1941 5 Sheets-Sheet 3

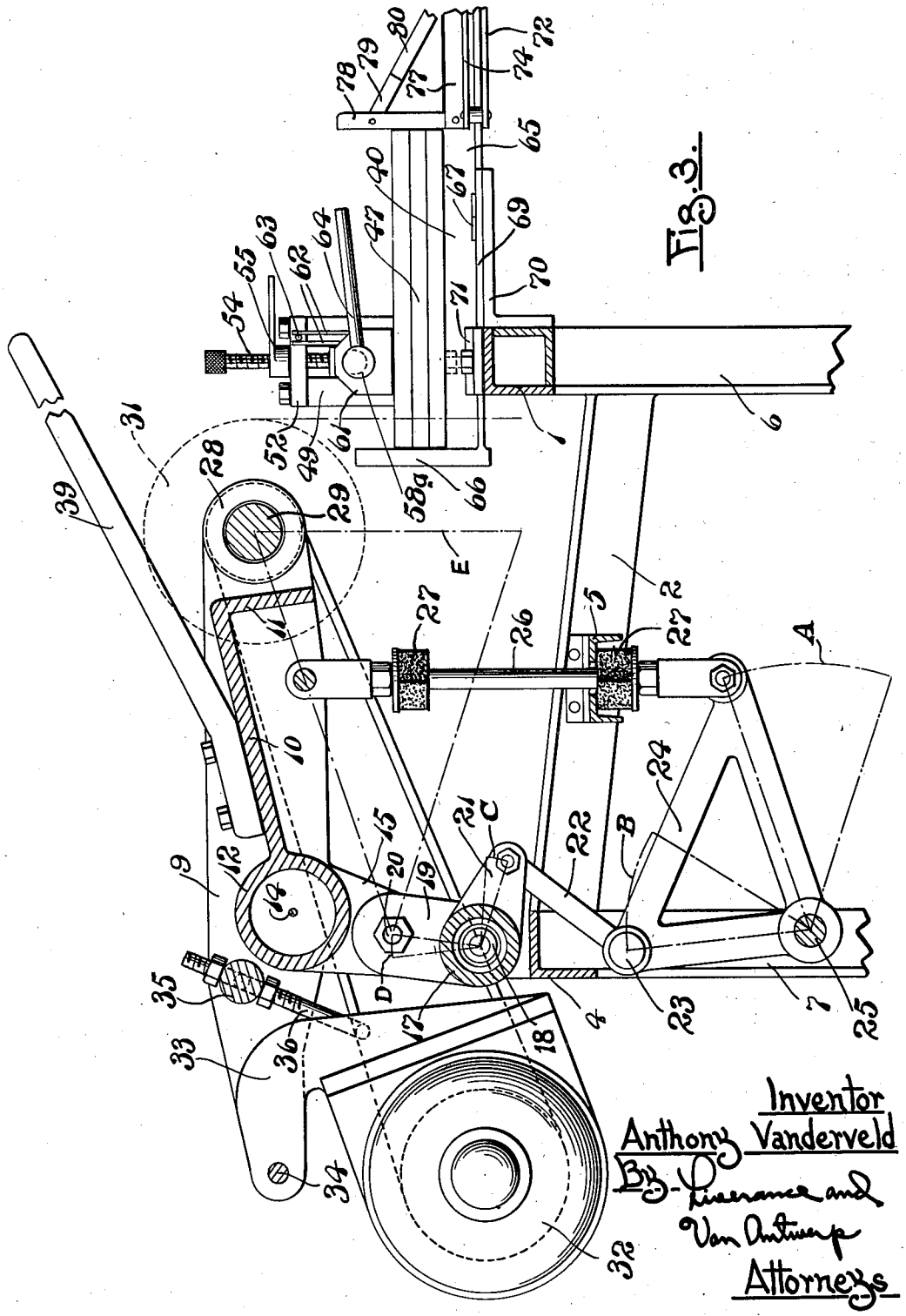


Fig. 3.

Inventor
Anthony Vanderveld
By Finnegan and
Van Antwerp
Attorneys

July 21, 1942. A. VANDERVELD 2,290,394

DADO MACHINE

Filed Feb. 10, 1941 5 Sheets-Sheet 4

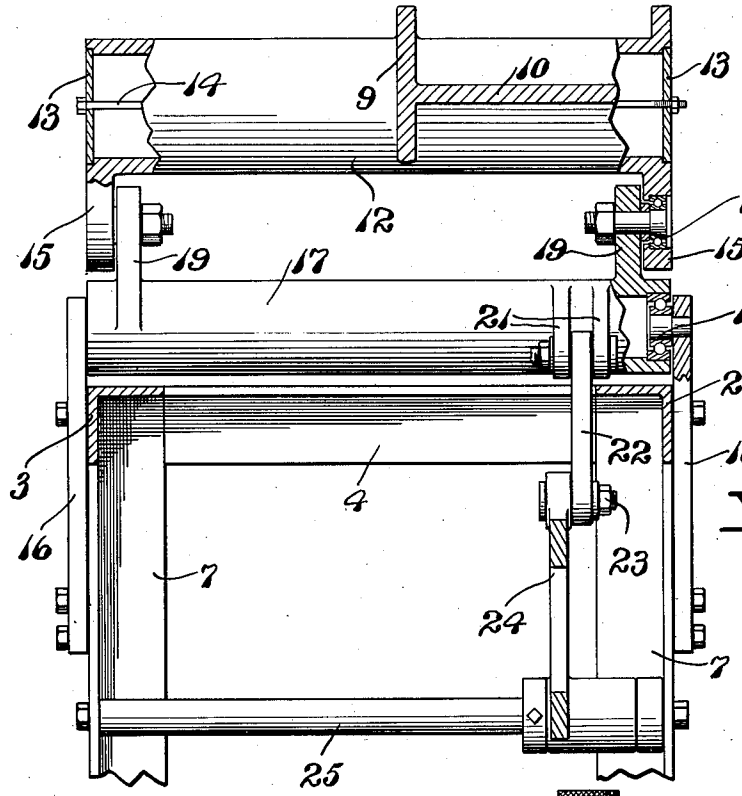


Fig. 4.

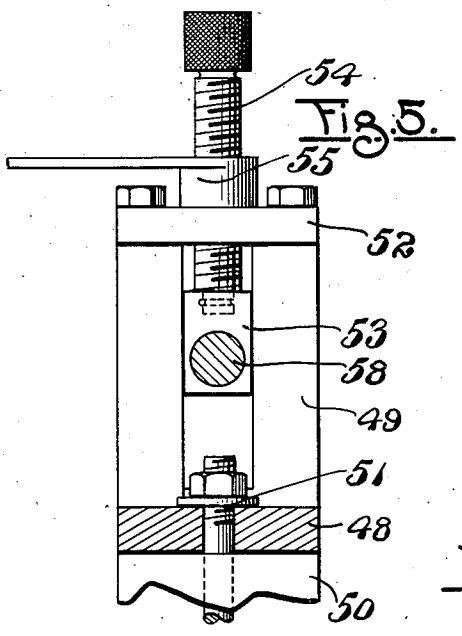


Fig. 5.

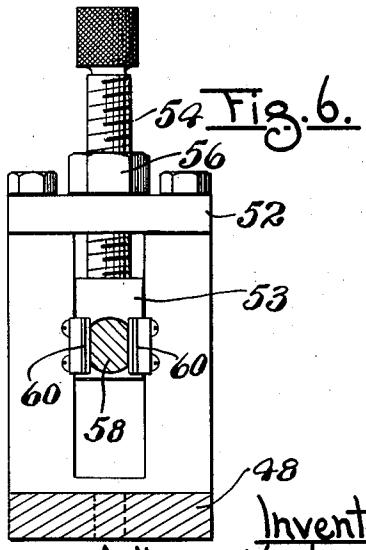


Fig. 6.

Inventor
Anthony Vanderveld
By Livernace and Van Antwerp
Attorneys

July 21, 1942. A. VANDERVELD 2,290,394

DADO MACHINE

Filed Feb. 10, 1941 5 Sheets-Sheet 5

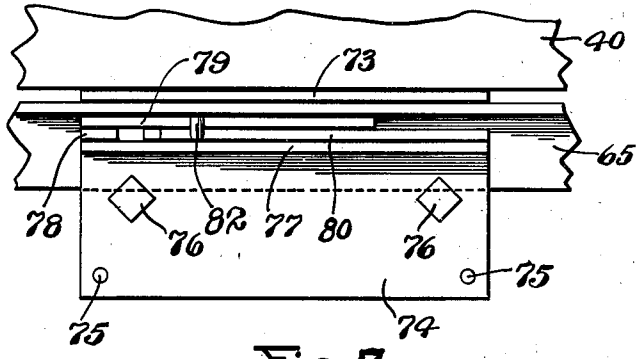


Fig. 7.

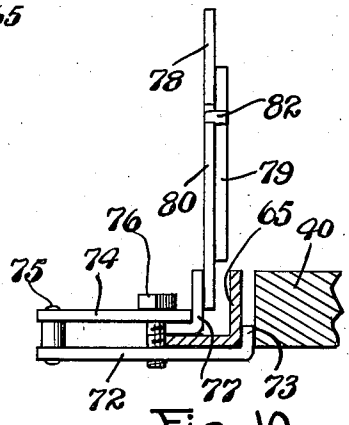


Fig. 10.

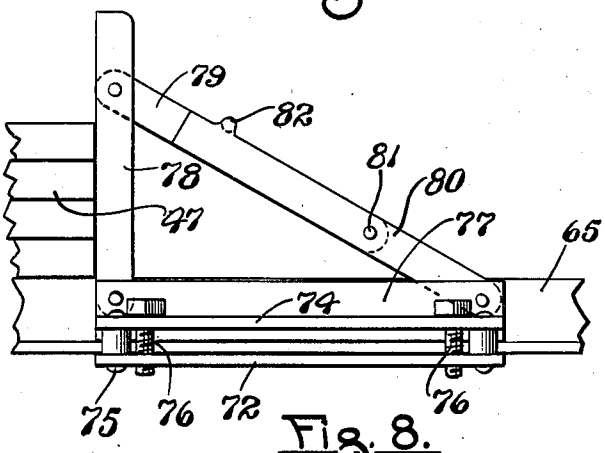


Fig. 8.

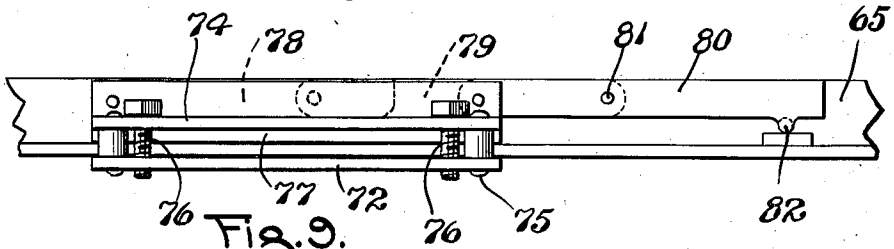


Fig. 9.

Inventor
Anthony Vanderveld
By Livernace and
Van Antwerp
Attorneys

Patented July 21, 1942 2,290,394

UNITED STATES PATENT OFFICE

2,290,394

DADO MACHINE

Anthony Vanderveld, Grand Rapids, Mich., assignor to Grand Rapids Store Equipment Company, Grand Rapids, Mich., a corporation of Michigan

Application February 10, 1941, Serial No. 378,156

4 Claims. (Cl. 144—133)

This invention relates to a wood-working machine particularly designed for cutting rectangular recesses, or dadoes, at the corners of boards. One place where such shaped notches or recesses are cut is at the corners of horizontal shelves in order to receive at least partly in such notches the corner posts of shelving units. Such type of shelving is largely used in store furnishings. In shelving units, the supporting frame includes a base and a top with four vertical corner posts, the shelves being supported by the corner posts and at the corners the shelves are recessed for the purposes stated. Of course the invention is not limited to this one specified use, but can be availed of whenever a large number of duplicate boards or the like are to have such recesses cut at a corner or corners therein.

In previous practice it has been usual to cut a corner recess in a single shelf, usually by sawing or other similar methods. This had to be repeated at each corner of the shelf and consumes considerable time. With my invention the corner notches that are wanted may be cut simultaneously in several of the shelves located one above another by a rotating cutter head driven at high speed which, with my invention, is moved in a straight path from one side to the other of the several shelves piled one above the other to cut the corner notches in all of the shelves at one operation.

One object and purpose of the present invention is to provide a machine of the class described and to mount a power driven rotating cutter head in a manner such that the cutter head may be moved in a direction perpendicular to the plane of the boards and not in any curved line of movement. With such construction the sides of the rectangular notches or recesses are at right angles to the flat sides of the shelves.

A further object of the invention is to provide a machine which is equipped with novel adjustable gauges so that shelves of different widths may be processed and in such shelves corner notches of different dimensions may be cut.

With the machine which I have devised and which embodies the invention, a large quantity production is attainable. The machine when once adjusted and set for a certain shelf can be left that way until a run of a large number of shelves has been put through the machine operation, and with each operation several of the shelves are processed. When the corner notch or recess in a shelf has been cut the side edges thereof are smoothed and planed and nothing further is required to be done.

The invention and a preferred form of construction of machine embodying it may be understood from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a plan of a machine embodying my invention.

Fig. 2 is a front elevation of the machine.

Fig. 3 is a central vertical section of the upper part of the machine, the plane of the section being from front to rear.

Fig. 4 is a fragmentary horizontal section through the machine at the rear portion thereof and at a plane below the cutter head unit.

Figs. 5 and 6 are enlarged elevations partly in section illustrating the adjustable mounting for a clamp to be forced against the uppermost of a stack of shelves for holding them against movement during the cutting operation.

Fig. 7 is a plan view of an adjustable edge gauge for the boards.

Fig. 8 is a side elevation thereof with the gauge in its operative position.

Fig. 9 is a similar elevation with the gauge folded to inoperative position, and

Fig. 10 is an end elevation with parts in section of the construction shown in Fig. 7.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction of the machine an upper frame is provided including a front horizontal bar 1 made preferably of two angle bars as shown in Fig. 3, two side rails 2 and 3 and a rear bar 4. Extending across between the side bars 2 and 3 is a bar 5 (Fig. 3) secured at its ends to a leg of each of the side bars. Vertical front posts 6 and rear posts 7 support the upper frame a distance above the floor; and such posts at their lower ends may be connected by cross bars 8 (Fig. 2). The materials used in making the frame are preferably angle bars to make a strong and rigid frame structure.

Above and to one side of the frame structure described, the cutter unit is located. It includes a support having two spaced apart parallel side bars 9 between which is a web 10 at the forward edge of which is a downturned flange 11 (Fig. 3) while at the rear edge is a hollow cylinder 12. The cylinder 12 with the web member 10 and flange 11 are cast integral with the side bars 9 and such cylinder 12 extends beyond the inner side bar 9 (Fig. 1) so that the cylindrical member is substantially equal in length to the width of the machine supporting frame. The open ends of the cylinder 12 are closed by flat plates 13

(Fig. 4) which are held in place by an elongated bolt 14 extending lengthwise of the cylinder 12 as shown in Fig. 4.

At each end of the cylindrical member 12 an integral arm 15 is cast which extends downwardly below the side bars 9. Two bars 16 of flat metal are bolted or otherwise permanently secured to the rear posts 7 and extend vertically above the frame. A hollow cylinder 17 lies between the upper ends of the bars 16 (Fig. 4) and is mounted for rocking movement on said posts through the anti-friction bearing construction shown at 18. Two arms 19 cast integral with the cylinder 17 extend inside of the arms 15, said arms 15 and 19 having a pivotal connection as illustrated at 20. The member 17 is also provided with two forwardly extending integrally cast arms 21 spaced a short distance apart, between which the upper end of a bar 22 is received and is pivotally connected (Figs. 3 and 4). The lower end of the bar 22 is pivotally connected at 23 to the upper apex or corner of a triangular shaped lever 24 mounted for rocking movement at its lower corner on a rod 25 extending between to the two rear posts of the frame 7. The lever 24 extends in a forward direction and at its front corner is pivotally connected to the lower end of a rod 26 which extends upwardly through an opening in the bar 5 and at its upper end has a pivotal connection to one of the arms 9 of the mounting for the cutter. Two rubber bumpers 27 are mounted on the rod 26 in spaced apart relation, one above and the other below the web of the channel bar 5.

The side bars 9 at their front ends extend a short distance ahead of the downturned section 11 of the web 10 and provide journals for the rotative mounting of a horizontal shaft 29 which extends therethrough. At one end the shaft is equipped with a grooved pulley 30. At the other end it carries a cutter head 31 of any suitable construction of rotating cutter for acting upon wood.

An electric motor 32 upon a suitable support is carried by arms 33 of the shape best shown in Fig. 3, which adjacent their free ends, are suspended on a rod 34 extending between and passing through the rear ends of the side bars 9. A cylindrical bar 35 extends between the sides 9 immediately back of the cylinder 12 and is mounted at its ends to permit rotative movement. A rod 36 passes through the part 35 and is threaded to receive the nuts shown in Fig. 3, one at each side of the part 35, the other end of the rod 36 being connected with one of the supporting arms 33 of the electric motor. The shaft of the electric motor is equipped at one end with a grooved driving pulley 37 around which and the pulley 30 a plurality of endless drive belts 38 are placed (Figs. 1 and 2) for driving the cutter head shaft from the motor. A handle 39 is bolted at one end to the upper side of the web 10 and extends in a forward and upward direction as shown.

The weight of the electric motor is sufficient to normally maintain the cutter head in an upper position, or that indicated in Fig. 3. The belts 38 may be tightened by adjustments of the nuts on the rod 36. On grasping the free end of the handle 39 and pushing downwardly the rod 26 moving in a vertical direction through the bar 5, turns the lever 24 in a clockwise direction with a resultant movement of the arms 21 and 19 in a counter-clockwise direction which will move the entire unit rearwardly while at the same time the cutter head is moving in a downward direction. The design of the parts and their proportions are such that the cutter head instead of taking a curved path about a center, such as the axis of the cylinder 17, instead takes a vertical path, that is a vertical chord of such curved path instead of an arc. The bumpers 27 alternatively engage against opposite sides of the bar 5 providing stops for the movement of the cutting unit and absorbing any shock when a stop to the movement is made in either direction.

The movements of the various parts which permit the cutting head to be moved in a vertical plane is clearly shown by the dot-dash lines in Fig. 3. It will be noted in this figure that the downward movement of the cutting head imparts a similar movement to the rod 26 which is connected at its lower end with the triangular shaped lever 24. This lever, being mounted to pivot at 25, will impart an arcuate movement to the bottom end of the rod 26 which is indicated at A. Likewise the pivotal connection at 23 will have a forward arcuate movement as shown at B. This arc B will cause the upper end of bar 22 to move upwardly in the arc C which is equal to the rearward arcuate movement of the pivot 20 as shown at D. The pivotal point 20 is in horizontal alinement with the center of the shaft 29 when it reaches the half-way mark in its upward or downward movements and the arc D must equal the distance between the arc which the shaft 29 would ordinarily make and the chord E of such arc at the half-way mark. It will thus be seen that in the downward movement of the cutting head the pivot point 20 will reach its rearmost position on the arc D when the cutter head is half-way down and this point will move forwardly again as the cutting head continues its downward movement. The same motion occurs on the upward movement of the cutting head thereby forcing it to move in a vertical plane.

At the front of the machine and extending forwardly therefrom a table 40 for supporting one end of the shelves or boards to be processed is permanently secured to and above the front bar 1 and is braced at its front end by a downwardly and rearwardly extending diagonal bar 41 bolted thereto at its upper end and to a part 8 of the base of the frame at its lower end (Fig. 2). A second bar 42 is permanently secured at one end to and adjacent the upper end of the vertical front post 6, extends outwardly a distance, is likewise supported and braced by a diagonal brace 43 and further by a brace 43a (Fig. 1) connected thereto and attached at its rear end to a rear portion of the frame. Over the bar 42 a supporting carriage consisting of a horizontal angle bar 44 with blocks 45 of wood secured therein is used, in the operation of the machine resting the bar 44 upon the bar 42 and supporting said bar 44 at one or both ends by a vertical rod 46 as shown in Fig. 2. The boards or shelves 47 to be processed are located at one end portion over the inner end of the table 40, extend outwardly to one side of the machine over the bar 42 and rest upon the blocks at 45.

The inner ends of the boards or shelves are gauged as to their inner position by coming against a U-shaped gauge comprising a lower horizontal bar 48 and two vertically extending arms 49 turned upwardly one at each end thereof. The bar 48 is provided with longitudinal

slots and rests upon spacing blocks 50 on the front member 1 of the upper frame, and is adjustably secured in place by bolts 51 passing upwardly through the frame, blocks and bar 49 to receive nuts, it being evident that this gauge member may be adjustably shifted to different positions and then on tightening the nuts on the bolts 51 held in place.

Each of the vertical sides or arms 49 is slotted between its side edges and over the upper end of each a bar 52 is secured. Blocks 53 (Figs. 5 and 6) are slidably mounted in the slots of arms 49. Each is connected with a vertical screw 54 threading through its associated bar 52 and the screw 54 mounted in conjunction with the inner arm 49 is provided with a locking nut 55 having a handle for manual operation. The other or outer screw 54 carries a nut 56 above which the screw is flattened or recessed at one side, in which recess the free end of a spring 57 (Fig. 2) carried by the adjacent bar 52 is adapted to engage to hold said screw 54 against accidental movement.

The blocks 53 serve as bearing mountings for a shaft 58 extending between them and through the block on the inner arm 49, said shaft carrying a located collar 59 as shown in Fig. 2. Adjacent its outer end the shaft 58 is flattened on opposite sides (Fig. 1) and flat leaf springs 60 mounted on the outer journal block 53 engage said flattened portions of the shaft and normally hold said shaft against rotation.

The shaft 58 is enlarged and extended beyond the inner arm 49 as an eccentric 58*a* on which a clamp 61 is mounted, held against rotation by spaced pins 62 extending upwardly therefrom, one at each side from a lateral pin 63 extending outwardly from the adjacent bar 52 (Fig. 3). Shaft 58 may be manually rocked by a handle 64 connected to and extending radially from the eccentric section 58*a* to raise or lower the clamp. The shaft with the clamp 61 thereon may be adjusted to different vertical positions in accordance with the total thickness of the boards or shelves 47 which are to be acted upon by the cutter. Normally the clamp 61 will be in an upper position when the shelves 47 are put in place and brought at their ends against the inner arm 49, the leaf springs 60 yieldingly holding the shaft against turning. But on rocking the shaft by means of the handle 64 the clamp is lowered and through the eccentric construction described is brought against the uppermost of the shelves 47 and may be forced with a considerable degree of pressure thereagainst to securely hold the shelves against movement.

The rear side edges of the shelves are likewise properly located in place, a gauge for such purpose being provided. A horizontal angle bar 65 extends forwardly of the machine parallel to but spaced a short distance from the outer edge of the table 40. At its inner end a vertical edge gauge bar 66 is welded in place. The bar 65 at its inner or rear end portion lies upon the front member 1 of the frame and may be longitudinally moved inwardly or outwardly. It carries a pointer 67 at its upper side (Fig. 1) in association with a scale 68 made upon the upper side of a fixed scale bar 69 connected to and at the upper side of an angle bracket 70 which is secured at the front face of the frame member 1 and has a horizontal leg extending forwardly thereof (Figs. 1 and 3). The horizontal leg of the bar 65 passes underneath a releasable clamp 71 mounted adjacent an end of the front frame member 1 which may be released or tightened by means of the screw shown in Fig. 3, thereby locking the edge gauge at 66 in a position to which adjusted, and in accordance with the position preselected by the position of the pointer 67 with reference to the scale 68. Therefore, when the shelves are placed in the machine their rear edges come against the gauge at 66, their front ends against the arm 49.

It is desirable also that the shelves 47 shall be engaged against at their forward edges to force them all into proper vertical edge alinement before the clamp at 61 is brought down upon the uppermost shelf. A device for this purpose is shown in Figs. 7 to 9 inclusive. Underneath the angle bar 65 a plate 72 is positioned having an upturned lip 73 at its inner edge which lies between the vertical leg of the angle bar 65 and the adjacent edge of the table 40. A plate 74 is located substantially over and parallel to the outer portion of the plate 72 and connected and held therewith in spaced apart relation by pins and spacing sleeves 75. Releasable clamping screws 76 pass through the plate 74 and thread into the plate 72 immediately at the outer edges of the horizontal leg of the angle bar 65. Between said horizontal leg of the bar 65 and the inner edge portions of the plate 74 an angle bar 77 is located with its horizontal leg in a position to be clamped on tightening the screws 76, its vertical leg extending upwardly above the plate 74.

A bar 78 is pivotally mounted at one end on an end of the vertical leg of the angle 77. A short distance from its other end and at its inner side one end of a bar 79 is pivoted. A third bar 80 is pivoted at one end near the opposite end of the vertical leg of the angle 77. The opposite end of the bar 79 is pivoted as at 81 to the bar 80 at a point between its ends so that the bar 80 in one position as in Fig. 8, lies partly alongside the bar 79. The bar 80 is provided with a finger at 82 projecting laterally as shown.

The construction described may be clamped at a desired position on the angle bar 65 for a width of shelf which is to be notched and the parts on assuming the position shown in Fig. 8 will locate an edge of the bar 77 against edges of the shelves 47 bringing them into true vertical alinement with each other. By grasping the finger at 82 the parts may be turned to the position shown in Fig. 9 all thereupon lying below the upper side of the table 40. When a number of the shelves 47 are to be placed in the machine they are placed with the construction just described in its folded position shown in Fig. 9, brought against the edge gauge at 66 and the end gauge at 49 after which, with the parts in the position shown in Fig. 9, the bar 80 is lifted at its free end and turned about the axis of its pivotal connection to the angle 77 until the finger at 82 comes against the bar 79. This brings the edge gauge at 78 into its vertical position, shown in Fig. 8, vertically alining the shelves at their edges.

On the bar 44 (Fig. 1) a vertical angle member 83 is secured which is alined to be in the same vertical plane at its outer side with the outer side of the gauge bar 66. This aids in properly locating the shelves in place.

With a plurality of the shelves thus located and held by the clamp 61, the handle at 39 is moved in a downward direction, the electric motor having been previously started so that the cutter head 31 is rotating at full speed. The

cutter head is moved downward vertically, cuts the desired notch or dado out of the same corner of each of the several shelves which are in place and is then returned to upper position, the finger at **82** grasped and the front edge gauge turned to the position shown in Fig. 9, clamp **61** released and the shelves removed from the machine or turned over for the same operation on the opposite corner.

It is apparent with this construction of machine that many and various widths of shelves may be processed and that the lengths and depths of the corner recesses or dadoes be anything desired within the limits of adjustment of the end and edge adjustment devices which have been described. The number of shelves which may be thus operated upon at one time will be governed by the thickness of the shelves and the vertical position to which the clamp **61** is adjusted. The machine can be worked in connection with one shelf or two or more and, of course, this number could be increased with a different size of machine. Also the number of shelves which may be notched or recessed at their corners at one time will be governed by the thickness of the shelves. It is also apparent that by setting the end gauge farther over to the right in Fig. 2 or providing mountings whereby it may be thus set further over a rectangular mortise could be cut from the shelves if such notching or processing was desired. The machine is primarily designed for large quantity production and a saving of time and labor in connection with an operation which has heretofore been made with respect to shelving at one corner of one shelf at a time. The novel construction for maintaining the path of movement of the cutter head vertical and not in the arc of a circle has proved exceptionally practical, useful, and efficient in this machine, which has been built and is in active use and is completely satisfactory for the purpose for which it was designed.

The invention is defined in the appended claims and is considered comprehensible of all forms of structure coming within their scope.

I claim:

1. In a structure of the class described, a supporting structure, a cutter unit located over the supporting structure and extending generally from the rear toward the front thereof including, an elongated support, a cutter head thereon at its forward portion and to one side thereof a shaft carried by said support on which the cutter head is secured, a motor at the rear end of said support, and driving means between said motor and shaft, a horizontal rock shaft on said supporting means between the ends of and below said cutter unit support, arms extending upwardly therefrom, other arms extending downwardly from the cutter unit support pivotally connected to the first mentioned arms, and means interposed between the cutter unit support and said rock shaft for rocking the shaft in a rearward direction upon downward movement of the forward end of the cutter unit, thereby simultaneously moving the shaft carrying the cutter head downwardly and rearwardly, the axis of the shaft traversing a vertical plane.

2. In a machine of the class described, a supporting structure, a cutter head unit located over said supporting structure and extending generally from the rear toward the front thereof including, an elongated support, a shaft rotatably mounted transversely of and at the front of said support, a cutter head secured on said shaft, a motor at the rear end of said support and a driving connection between the motor and said shaft, a rock shaft mounted on the supporting structure below and between the ends of the cutter unit support, arms extending upwardly therefrom, arms extending downwardly from the cutter unit support having pivotal connection to the first mentioned arms, an additional arm connected to the rock shaft extending therefrom in a forward direction, a bell crank lever pivotally mounted on the supporting structure, a link connecting the last mentioned arm with one end of the bell crank lever and a rod connecting the cutter unit support with the other end of the bell crank, as and for the purposes specified.

3. A construction containing the elements in combination defined in claim 2, combined with a bar through which said rod passes and yielding bumpers carried on said rod, one above and the other below the bar, as specified.

4. In a machine of the class described, a supporting structure, a cutter unit located above said structure including an elongated support extending generally from the rear toward the front of the supporting structure, a horizontal shaft rotatably mounted at the forward end of said support, a cutter head on said shaft, an electric motor suspended from the rear end of the cutter unit support, driving connections between the motor and shaft, a rock shaft carried by said supporting structure ahead of said motor, arms extending upwardly therefrom, other arms extending downwardly from the cutter unit support having pivotal connection to the first mentioned arms, an additional arm extending forwardly from said rock shaft, and means interposed between the cutter unit and said additional arm for moving said additional arm in an upward direction upon downward movement of the forward portion of the cutter unit thereby moving the shaft on which the cutter head is secured downwardly in a vertical plane.

ANTHONY VANDERVELD.