D. CAMERON.

WOODWORKING MACHINE.

APPLICATION FILED DEC. 19, 1916.

1,300,815.

Patented Apr. 15, 1919.

3 SHEETS—SHEET 1.

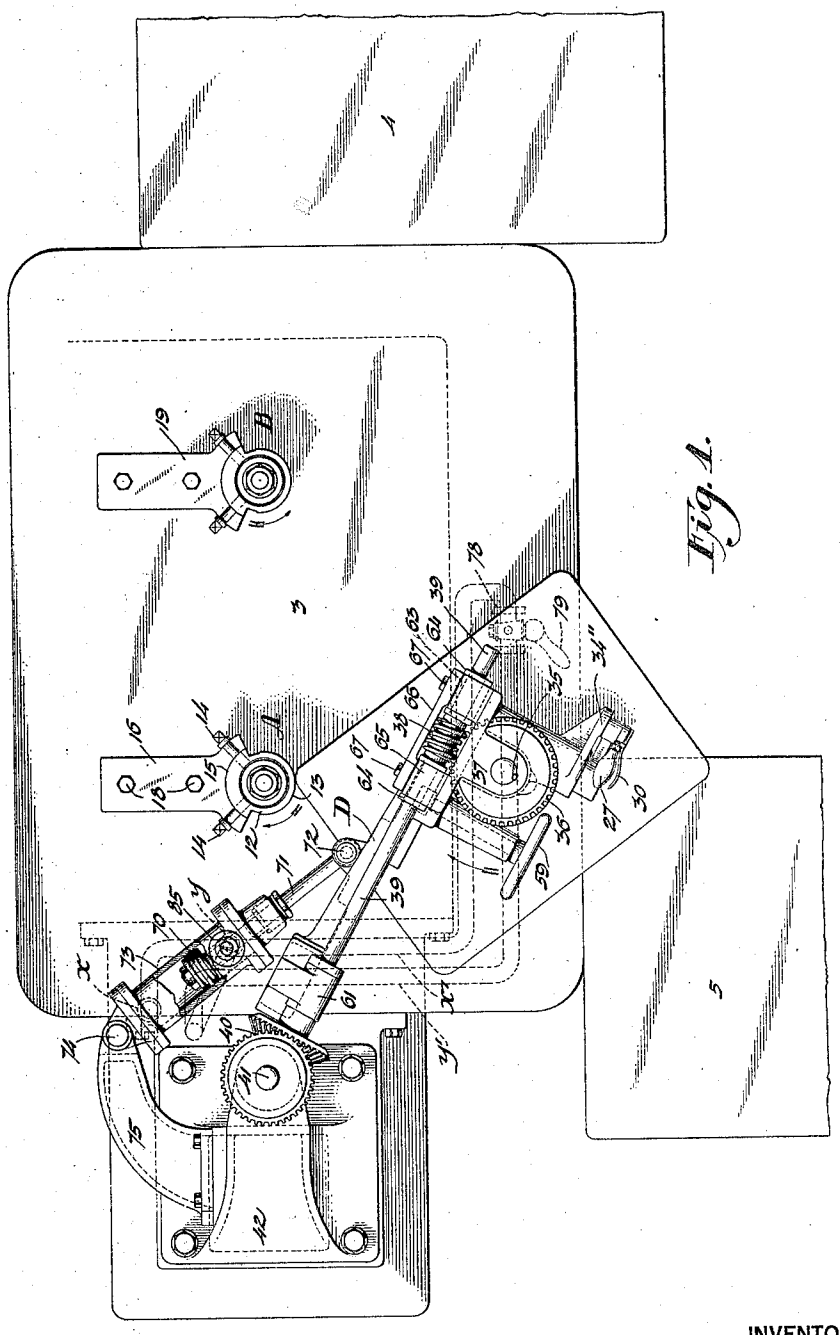


Fig. 1.

Witness:

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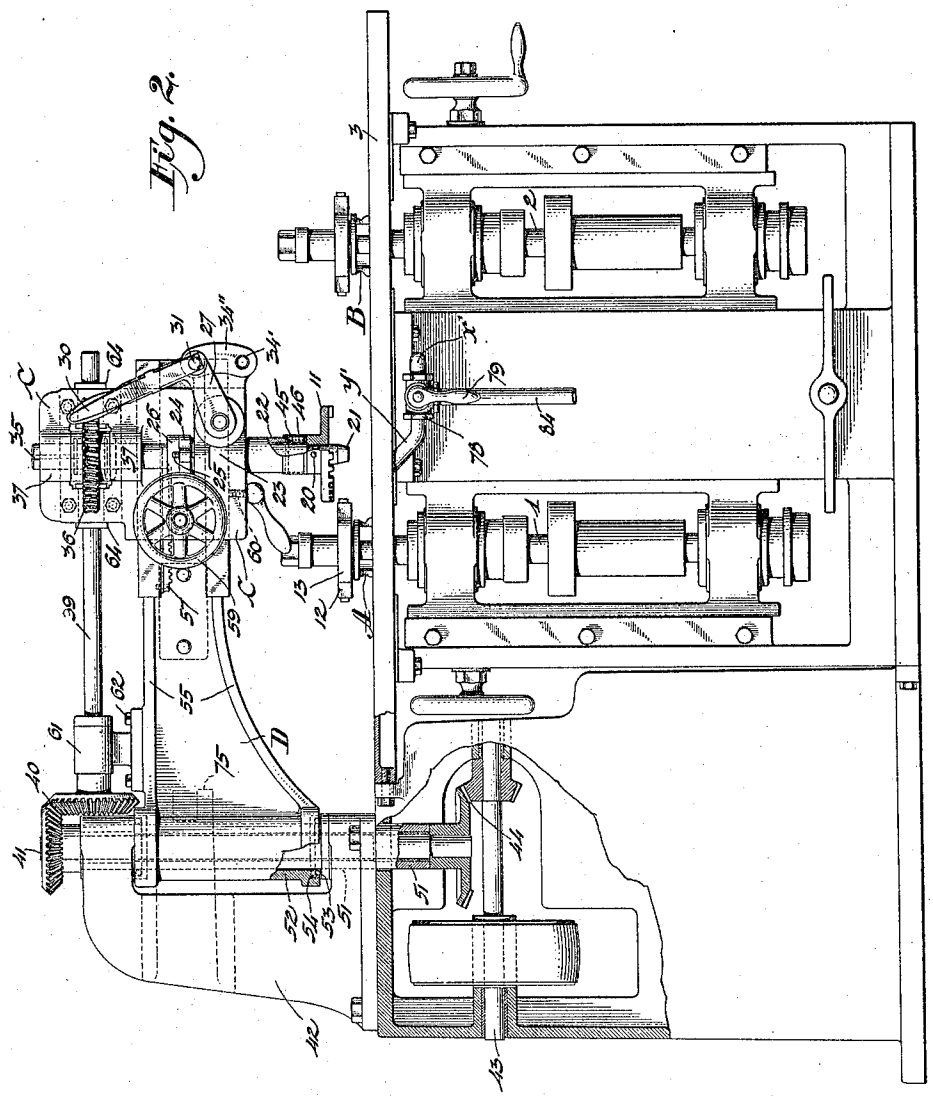
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3 SHEETS—SHEET 2.

Fig. 2.



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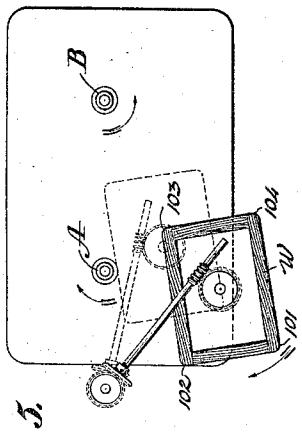


Fig. 5.

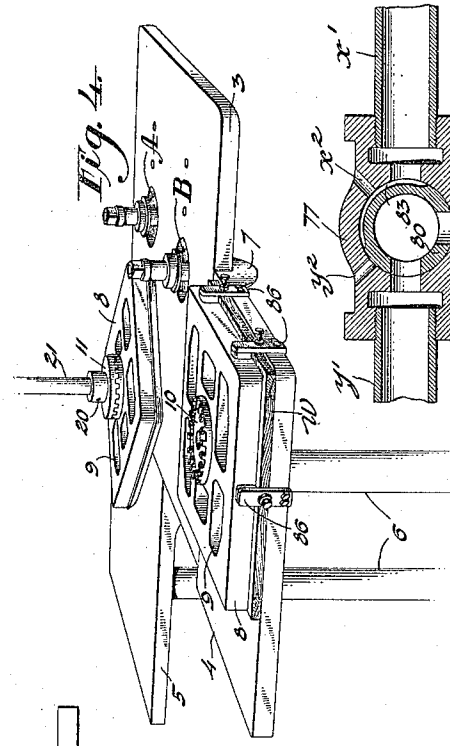


Fig. 4.

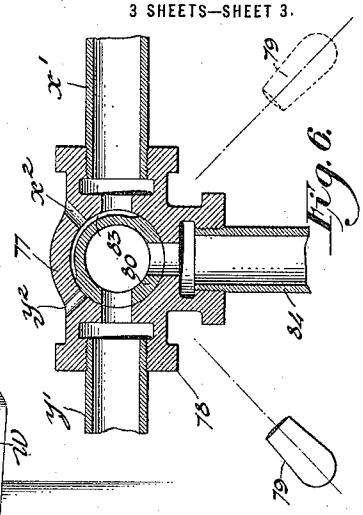


Fig. 6.

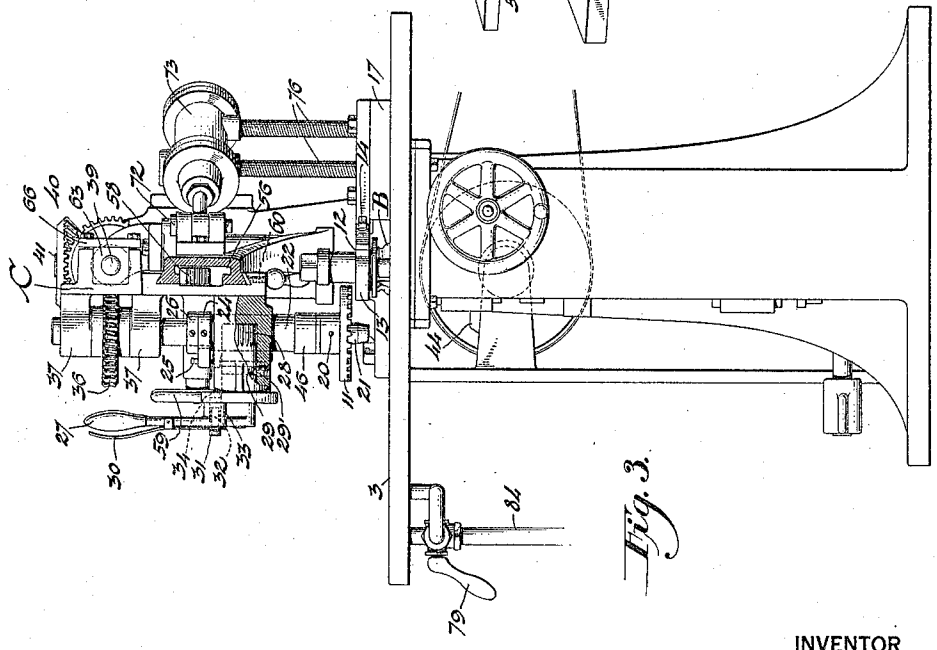


Fig. 3.

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UNITED STATES PATENT OFFICE.

DUGALD CAMERON, OF ST. JOHNS, QUEBEC, CANADA, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

WOODWORKING-MACHINE.

1,300,815. Specification of Letters Patent. Patented Apr. 15, 1919.

Application filed December 19, 1916. Serial No. 137,753.

To all whom it may concern:

Be it known that I, DUGALD CAMERON, a subject of the King of the United Kingdom of Great Britain and Ireland, and resident of St. Johns, Province of Quebec, Canada, have invented certain new and useful Improvements in Woodworking-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a wood-working machine of the shaper class and aims to provide a work-handling mechanism therefor which will increase the output of an operative.

More specifically it has for its object the equipment of a shaper with an attachment for automatically finishing a board to predetermined dimensions and outline, with the edges straight or curved as desired, so as to relieve the operative from a large proportion of heavy manual labor and permit the work to be done rapidly, uniformly and precisely.

The invention, as applied to a shaper having a pair of cutters rotatable about spaced vertical axes above a horizontal table, consists in the equipment thereof with a work-handling mechanism comprising a form rotated through suitable driving connections with a power-shaft and, while rotating, being held against an edge-guide concentrically disposed above one of the rotating cutters by means of a pneumatic plunger loosely pinned to one side of a swinging arm carrying said driving connections for rotating the form and reciprocating in a cylinder held against endwise movement by a pivotal connection with a fulcrum-arm which is rigidly connected to a pedestal which in turn is fixedly secured to the main frame of the machine.

The invention consists further in features of construction which will appear in the detail description of the device illustrated in the accompanying drawings, in which Figure 1 is a plan view and Figs. 2 and 3 are side and end elevations, respectively, of the preferred embodiment of my invention; Fig. 4 is a perspective view showing two forms with an attached block in different stages of the operation; Fig. 5 is a diagram showing the relative rotary movements of the several elements; and Fig. 6 is a cross section of the controlling valve.

In the embodiment of the invention illustrated in the drawings a Baxter D. Whitney shaper #8 is shown but obviously various types of shapers may be employed. The above mentioned shaper is well-known and only needs a brief description. A pair of cutters A and B on the shaft 1, 2 and revolving about spaced vertical axes and located above the horizontal table 3 of the machine are adapted to be driven in opposite directions through suitable belt connections with a power-shaft. The cutters may be shaped to cut the edges of a board straight and square, beveled, or curved, as desired, those shown cutting the edges of a board in the shape of an ogee curve as indicated on the drawing. The table is of rectangular shape and its surface may be augmented by providing extensions 4 and 5 located preferably at the right side and left front of the table viewed in plan as in Fig. 1, said extensions being supported in any suitable manner as by legs 6 and clamps 7. Any suitable means may be used for nicely adjusting the cutters to a position immediately above the table so that work held flat on the table will be cut clean without ragged edges.

A durable form 8 made as light as the strength of the material will permit by cutting it out as at 9 is bolted to the lower member 10 of a clutch, the upper member 11 of which is rotated at a speed suited to the R. P. M. of the cutters, by a train of connections to be hereinafter described. By means also to be described the rotating form is held against the edge of a stationary guide 12 located directly above the left-hand revolving cutter A with its circular edge 13 concentric to the axis about which the cutter revolves. The stationary guide 12 may be supported in any suitable manner but preferably as shown is supported by means of screws 14 entering its circular rear face 15 and clamping the same solidly in the similarly shaped seat of a supporting plate 16 which is spaced by a block, similar to that shown at 17, the proper distance above the table to which the guide is clamped by means of bolts 18. A second stationary guide similar in every detail to the one

above described is located above cutter B as indicated at 19.

The form secured to the lower member 10 of the clutch is rotated by the upper member 11 thereof which is pinned at 20 to a spindle 21 journaled in a sleeve 22 loosely supported in the vertical bore of a block 23 integral with a saddle or carriage C, Fig. 2. To the upper end of the sleeve 22 is fixedly secured a supporting collar 24 having a projecting ear pierced by an adjustable stop 25. A second collar 26, fast to the spindle 21 and above the supporting collar 24, affords means for lifting the spindle endwise or axially when an L-shaped hand-lever 27 rigidly connected with a horizontal pinion 28 meshing with teeth (not shown) on the outside of the sleeve 22 is moved downward from the position shown in Fig. 2. The pinion shaft is channeled at 29 to receive the end of a pin 29′ threaded into the saddle for preventing endwise movement of the pinion. The lever 27 has mounted thereon a finger-lever 30 which is slotted at its lower end to embrace the head 31 of a plunger 32. A spring 33 coiled about the plunger and pocketed in a suitable well or recess in the lever 27 reacts when under compression to thrust the tapered end 34 of the plunger into either of two similarly tapered sockets 34′ in a plate 34″ rigid with the saddle. Adjacent the upper clutch member a spring 45 housed in a collar 46 is coiled about the spindle 21, said spring 45 being adapted to thrust the clutch-member 11 downward away from the lower end of the sleeve 22. In the position shown in Fig. 2 the adjustable stop 25 is resting against a suitable abutment on the saddle C. The stop 25 will assist the operative in bringing the lever 27 up to a position in which the plunger registers with the upper of the two sockets 34′ in the saddle, rendered difficult by the compression of spring 45 at this time. As shown in Fig. 2 with the lower member 10 of the clutch removed, the collar 26 is in contact with the collar 24 under the action of spring 45 on the upper clutch-member 11 tending to force it away from the lower end of the sleeve 22 held in the position shown in Fig. 2 by the pinion which is of course secured against movement by the plunger 32 seated in one of the sockets 34′. When work secured to the form 8 of the lower clutch-member 10 is in place under the spindle, collar 26 will be spaced from collar 24 and the spring 45 will be exerting a pressure upon the work to hold it flat against the table. Obviously the strength of this spring may be suited to the requirements of the work.

The train of mechanism for rotating the spindle and form at a suitable speed, in this machine about 3 R. P. M., is readily understood from an inspection of Fig. 2 of the drawings. The upper end of the spindle is feathered as indicated at 35 to the tubular hub of a worm-gear 36 supported against axial displacement by lugs 37 integral with the saddle. The worm-gear is driven by a worm 38 at the forward end of a horizontal shaft 39 which, through miter gears 40 at its rear end driven through a vertical shaft 41 journaled in a pedestal 42, is rotated from a horizontal power-shaft 43 through beveled gearing 44 at the lower end of the vertical shaft 41.

The driving mechanism above mentioned for rotating the form 8 is in large part carried by a swinging arm D pivotally supported on a sleeve 51 embracing the vertical shaft 41. For diminishing the friction of the boss 52 of the arm which is bored to embrace the sleeve 51 any suitable anti-friction means may be employed such as the ball bearings 53 in the raceways indicated at 54. The arm is stiffened by flanges 55 extending from its web or body portion toward the front of the machine. At the free end of the arm the flanges are machined to form a T-shaped guideway 56 receiving a similarly shaped member of the saddle. A rack 57 attached to the upper flange of the arm is engaged by a pinion 58 movable with the saddle and operated by a hand-wheel 59. Any suitable device may be used to lock the saddle in adjusted position such as the screw indicated at 60 threaded into the saddle and adapted to be jammed against the lower flange of the swinging arm.

To permit rotary and bodily sidewise movements being imparted to the form simultaneously, the horizontal shaft 39 carrying the worm is arranged with its axis intersecting the axis of the vertical shaft 41 about which the arm may be swung horizontally. Adjacent the vertical shaft 41 the horizontal shaft 39 is supported on the arm D in a bearing bracket 61 bolted thereto as at 62. At its free end the horizontal shaft 39 is supported on both sides of the worm in a pair of bearing blocks 63 having flanges 64 embracing supporting ears 65 projecting rearwardly from the saddle C with which they are integral, said blocks being held in place by a cover-plate 66 adjustable by means of bolts 67 and together with shims, not shown, affording means for taking up lost-motion resulting from wear in the worm and gear.

For imparting bodily movement to the form in order to hold it against the stationary guide and to thereby properly shape the board which is held flat upon the table and is rotated with the form, any suitable device may be employed that will exert a sufficient force to hold the form against the stationary guide, while the cutter trims the work, and at the same time permit the form to be shifted bodily toward and from the axis of the cutter. A satisfactory device which an-

swers the above requirements is a pneumatically operated piston 70 carrying a plunger-rod 71 loosely pinned at 72 to one side of the pivotally supported arm D and reciprocating in a cylinder 73 also loosely pinned at 74 to a fulcrum-bracket 75 fixedly connected to the pedestal 42 previously mentioned. Air at a suitable pressure, in the machine portrayed about 80 lbs., is admitted to either end of the cylinder 73 through ports X and Y connected by flexible tubing 76 to rigid pipes X′ and Y′ arranged beneath the table which pipes are joined together by a T constituting the body 77 of a two-way valve indicated generally at 78 operable by a handle 79 connected to the valve stem 80. The valve body 77, see Fig. 6, is provided with a pair of exhaust openings X^2, Y^2, so arranged with relation to a peripheral exhaust passage 83 cut in the valve stem that when the valve handle 79 is turned to the left at an angle of 45° with the vertically extending supply pipe 84 connected to the valve body 77, air passes through the valve to the pipe Y′ and into the cylinder in back of the piston, exhausting from the other end of the cylinder into the pipe X′ and thence through the passage 83 in the valve stem out the exhaust opening X^2 in the valve body. When the valve handle is turned to the right at an angle of 45° with the supply pipe, as indicated in dotted lines in Fig. 6, the air passes in the opposite direction as will be obvious from an inspection of the drawings. A cut-off valve, not shown, may be conveniently located in the supply pipe 84 below the valve. It will be obvious that the pneumatic plunger can be used for advancing and retracting the form from contact with the stationary guide above the cutter as well as for holding the form in tangential relation with said guide, the valve-handle affording means for readily accomplishing such movements. A suitable pressure relief valve is provided in the cylinder as indicated at 85.

In operation a form, secured to the lower member of the clutch, is placed upon a board or frame W roughly finished to size and tapped with a rubber-faced mallet to drive spurs, not shown, suitably disposed on the lower face of the form into the block. This may be done on table extension 4 equipped for convenience with gages 86. After thus securing the form and block or frame together the operative trims the diagonally opposite corners 101 and 103 only of the block (see Fig. 5) on the available cutter B holding the form by hand against the edge-guide 19 in order to cut with the grain of the wood and prevent splintering which would result ordinarily if these same corners were presented to the cutter A. The foregoing operations may be performed before a second form, with its attached board, completes a rotation in tangential relation with the other cutter. Thus while the operative is preparing one board the machine automatically trims the other.

The cutters are rotated in opposite directions, cutter A being turned clockwise and cutter B counter-clockwise while the form driven by the work-spindle is rotated in the same direction as cutter A in order to cut with the grain of the wood when trimming corners 102 and 104 of the board.

The spindle, through which the form is driven, is of course bodily shifted or oscillated back and forth about the axis of sleeve 51 as a center, when the distance varies from the axis of rotation of the form to the point of contact of the form with the stationary guide 12. The frequency of this bodily movement of the form horizontally in a plane transverse to or at a substantial angle with the axis of rotation of cutter A will vary with the form's contour or outline which may be made almost any shape desired being limited only by the reëntrant curvature in the edges of the form which the cutter can duplicate in the work. The form is thus a means for predetermining the outline, shape or contour of a board, the edge of which may be shaped as desired by employing a suitably machined cutter.

While the machine is especially designed to handle non-circular boards, it is obviously capable of handling circular boards or disks. By holding the arm against movement in any suitable manner, with or without disconnecting the pneumatic plunger, it may be used with circular forms for cutting disks.

The horizontal adjustment of the spindle to and from the axis of the sleeve 51 about which the arm swings is an important feature in that it enables the spindle to be set to a position such that chattering in trimming the corners 102 and 104 of the board is eliminated. This position is approximately as shown in the plan view, Fig. 1, the angle between the axes of the cutter A, spindle 21 and sleeve 51, being about the same for various sizes and shapes of forms and it may be conveniently decribed as the critical angle for shaping.

By using the same piping alternately to supply air to the cylinder ports and exhaust it through the restricted openings in the valve body, the arm D is given a gradual steady movement without shock. And a uniform pressure of the form against the stationary guide 12 is insured by the relief valve 85.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a wood-shaping machine having a table for supporting the work, in combination, a rotary cutter having its cutting edges arranged above the table, an arm movable over and parallel with the table, a templet

between which and the table work is adapted to be clamped and confined for movement in a predetermined plane, means carried by the arm and connected to the templet for rotating said templet about an axis fixed relative to the arm and for holding the templet down upon the work and thereby holding the work flat upon the table, an edge-guide spaced above the table, means for moving said arm in parallelism with the table toward and from the axis of the rotary cutter, whereby work held flat upon the table may be shaped in conformity with the templet.

2. In a wood-shaping machine having a table for supporting the work, in combination, a rotary cutter having its cutting edges arranged above the table, an arm movable over and parallel with the table, a templet between which and the table work is adapted to be clamped and confined for movement in a predetermined plane, means carried by the arm and connected to the templet for rotating said templet about an axis fixed relative to the arm and for holding the templet down upon the work and thereby holding the work flat upon the table, an edge-guide spaced above the table, pneumatic means for moving said arm in parallelism with the table toward and from the axis of the rotary cutter, whereby work held flat upon the table may be shaped in conformity with the templet.

3. In a wood-shaping machine having a table for supporting the work, in combination, a rotary cutter having its cutting edges arranged above the table, an arm movable over and parallel with the table, a templet between which and the table work is adapted to be clamped and confined for movement in a predetermined plane, means carried by the arm and connected to the templet for rotating said templet about an axis fixed relative to the arm and for holding the templet down upon the work and thereby holding the work flat upon the table, said means including a detachable connection permitting removal and introduction of work without interrupting the operation of the means for rotating the templet, an edge-guide spaced above the table, means for moving said arm in parallelism with the table toward and from the axis of the rotary cutter, whereby work held flat upon the table may be shaped in conformity with the templet.

4. In a wood-shaping machine having a table for supporting the work, in combination, a rotary cutter having its cutting edges arranged above the table, an arm movable over and parallel with the table, a templet between which and the table work is adapted to be clamped and confined for movement in a predetermined plane, means carried by the arm and connected to the templet for rotating said templet about an axis fixed relative to the arm and for holding the templet down upon the work and thereby holding the work flat upon the table, said means including a detachable connection permitting removal and introduction of work without interrupting the operation of the means for rotating the templet, an edge-guide spaced above the table, manually controlled pneumatic means for moving said arm in parallelism with the table toward and from the axis of the rotary cutter, whereby work held flat upon the table may be shaped in conformity with the templet.

5. In a wood-shaping machine, in combination, a continuously rotating cutter, movable work-holding mechanism including a disengageable member to which work is adapted to be secured, continuously operated means for rotating the disengageable member of the work-holding mechanism, means for urging work on said member of the work-holding mechanism into contact with the rotating cutter and for advancing and retracting said member before and after the work is finished, and means for predetermining the shape to which the work is cut, said member being removable without stopping the operation of its rotating mechanism.

6. In a wood-shaping machine, in combination a continuously rotating cutter, movable work-holding mechanism including a disengageable member to which work is adapted to be secured, continuously operated means for rotating the disengageable member of the work-holding mechanism, pneumatic means for urging work on said member of the work-holding mechanism into contact with the rotating cutter and for advancing and retracting said member before and after the work is finished, and means for predetermining the shape to which the work is cut, said member being removable without stopping the operation of its rotating mechanism.

7. In a wood-shaping machine having a table for supporting the work, in combination, a rotary cutter extending above the table, an arm pivotally supported to swing over and in parallelism with the table, a templet, a drive shaft coaxial with the pivot of said arm, means for rotating said drive shaft, driving connections between the shaft and the templet for rotating the same, and means for moving said templet bodily in parallelism with the table, said table and a part of said driving connections being relatively movable to and from each other to permit of removing and inserting work.

8. In a wood-shaping machine having a table for supporting the work, an upright standard, arms extending laterally therefrom, one fixed to said standard and the other pivoted to said standard, a cylinder connected to one of said arms, a plunger within said cylinder connected to the other of said arms, a fluid medium under pressure

piped to said cylinder, a valve for controlling the flow of said fluid medium to said cylinder whereby the pivoted lateral arm may be moved in opposite directions, work-holding mechanism carried by the arm, in combination with a rotary cutter above the table, and means coöperating with a part of the work-holding mechanism for determining the configuration of the work.

9. In a wood-shaping machine having a horizontal table for supporting a block of wood, in combination, a rotary cutter above the table, an arm movable over and parallel with the table toward and from the axis of the cutter, a templet to which the block is adapted to be secured, a clutch part secured to the templet, a mating clutch part to which the first-mentioned clutch part is disengageably connected, means carried by the arm for positively rotating said mating clutch at a uniform speed, said means permitting separation of the clutch parts to facilitate introduction and removal of the work, and an edge-guide against which the templet is adapted to be held to insure conformity of the product with the configuration of the templet.

10. In a wood-shaping machine having a table and a rotary cutter, an arm pivotally supported for movement over and parallel with the table, a saddle adjustable on said arm, a rack and a pinion for effecting adjustment of the saddle on the arm, a spindle operatively supported on said saddle, means for rotating said spindle at a substantially uniform angular velocity, said last-named means including a slidable connection with said saddle permitting of the before-mentioned adjustment of the saddle on the arm, and work-holding mechanism connected with the said spindle for clamping the work flat upon the table and rotating it while the cutter trims its edges to a predetermined shape.

In testimony whereof I have signed my name to this specification.

DUGALD CAMERON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."