R. D. EMERY.

WOODWORKING MACHINE.

APPLICATION FILED NOV. 8, 1917.

1,337,695.

Patented Apr. 20, 1920.

3 SHEETS—SHEET 1.

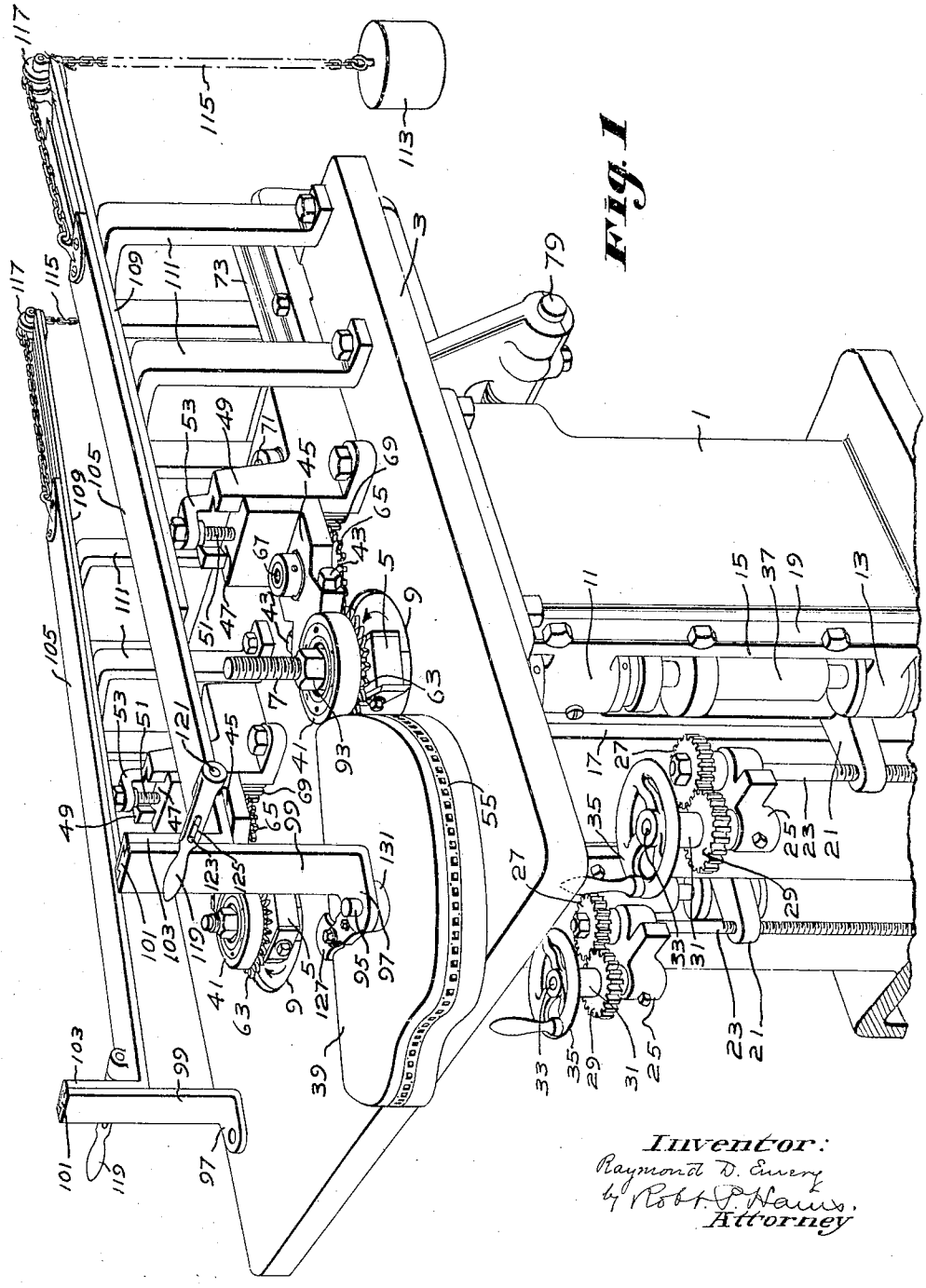


Fig. 1

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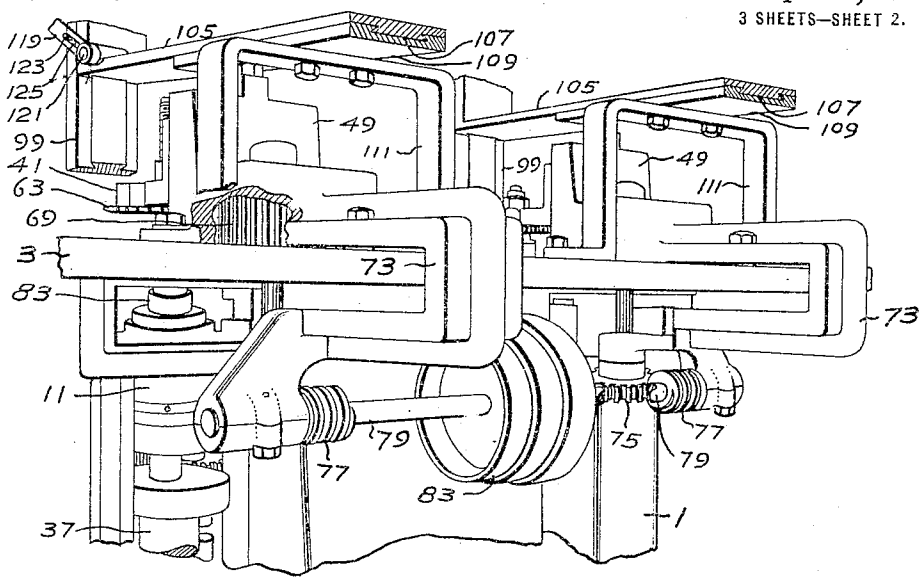


Fig. 2

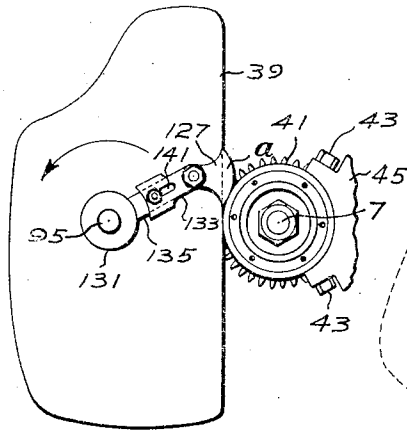


Fig. 3

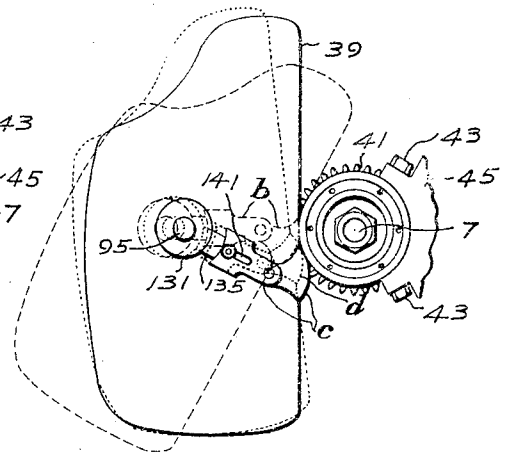


Fig. 4

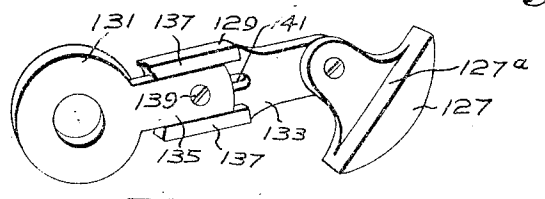


Fig. 5

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3 SHEETS—SHEET 3.

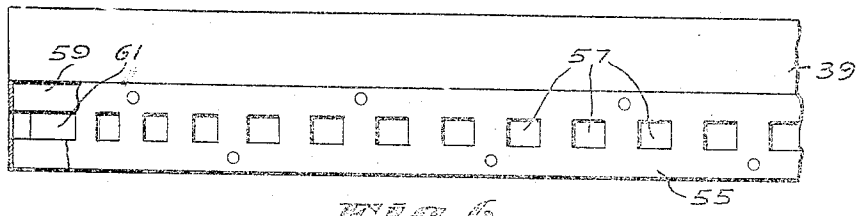


Fig. 6

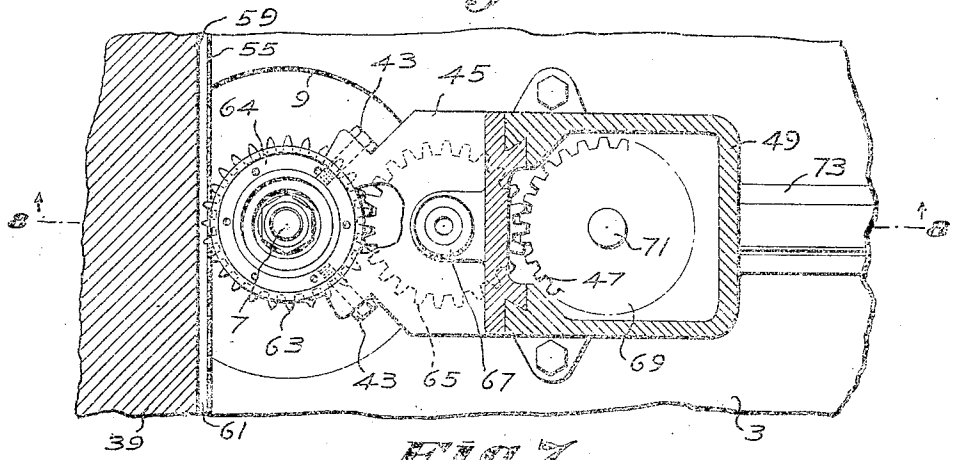


Fig. 7

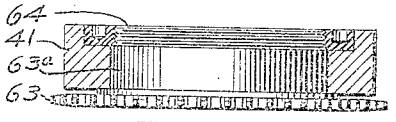


Fig. 9

Fig. 8

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UNITED STATES PATENT OFFICE.

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WOODWORKING-MACHINE.

1,337,695. Specification of Letters Patent. Patented Apr. 20, 1920.

Application filed November 8, 1917. Serial No. 200,912.

To all whom it may concern:

Be it known that I, RAYMOND D. EMERY, a citizen of the United States, residing at Winchendon, county of Worcester, and State of Massachusetts, have invented an Improvement in Woodworking-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention hereinafter described relates to woodworking machines for shaping articles to conform with a pattern. These machines usually comprise a rotary tool and means to feed a pattern with the work attached thereto, relatively to the tool, the construction being such that the work is shaped by the tool to conform with the pattern.

It is desirable to interrupt the feed of the work after the tool has completed its operation throughout the perimeter of the work, or after the feed of the work has advanced to a predetermined point. For example, it is sometimes desirable to use two cutters, rotating in opposite directions, the work being presented to one cutter to cut with the grain thereof until the direction of the grain with respect to the cutter changes; whereupon the work is shifted to and the cutting is completed by the other cutter. Thus the complete cutting operation can be performed with and not against the grain. One object of the present invention is to provide simple and effective stop means whereby the feed of the work relatively to the tool can be automatically interrupted at any predetermined point as desired.

To produce good results, the work should be fed positively relatively to the cutter by interengaging gear elements, and the elements should be held in engagement while the tool is acting on the work. Another object of the invention is to provide means for maintaining said gear elements in active engagement to feed the work, but permitting the stop means to disengage said elements to interrupt the feed at the time required.

For certain classes of work it is desirable to place the pattern above the work, whereas for other classes of work it is desirable to place the pattern beneath the work. Another object of the invention is to provide a tool and feeding devices for the pattern which may be interchanged or adjusted according to the character of the work and the relation between the work and the pattern.

The character of the invention may be best understood by reference to the following description of one good form thereof shown in the accompanying drawings, wherein:—

Figure 1 is a perspective view of a machine embodying the invention;

Fig. 2 is a perspective rear view of the machine showing parts in section;

Figs. 3 and 4 are plans illustrating the operation of the stop means for arresting the feed of the pattern;

Fig. 5 is a perspective view of the cam and arm of the stop means;

Fig. 6 on an enlarged scale is a side elevation of the rack on the pattern;

Fig. 7 is a view partially in plan and partially in section of the transmission for feeding the pattern;

Fig. 8 is a vertical section taken on line 8—8 of Fig. 7; and

Fig. 9 on an enlarged scale is a vertical section showing one of the pattern feed gears and its bearing.

Referring to the drawings,—the machine shown therein as embodying the invention comprises a standard 1 (Fig. 1) supporting a table 3, in the present instance of the invention, sufficiently large to accommodate two units comprising tools or cutters, and work feed mechanism coöperating therewith.

Each of these units comprises a rotary cutter 5 located above the table fast on a vertical shaft 7 projecting down through a hole 9 in the table a substantial distance beneath the latter. To permit the cutter to be adjusted to positions at varying distances above the table according to conditions as required, in the present instance, said shaft is journaled in bearings 11 and 13 (Fig. 1) in a cross head 15 adjustable vertically in guides 17 and 19 in the standard. The head has an ear 21 threaded to a screw shaft 23 having its upper end journaled in a bearing in a bracket 25 fast on the standard, said shaft being confined against movement axi-

ally thereof in said bracket. To rotate the screw shaft, a gear 27 is mounted fast on the upper end thereof, and driven by a gear 29 fast on the lower end of a sleeve shaft 31 journaled on a stud shaft 33 secured to said bracket, the upper end of said sleeve having a hand wheel 35 fast thereon. The construction is such that the hand wheel may be rotated and thereby rotate the gears and the screw shaft to cause vertical adjustment of the cross head and the cutter shaft to position the cutter the distance above the table desired.

To rotate the cutter shaft, a pulley 37 is mounted thereon and adapted to be driven by a belt (not shown) from any suitable source of power.

Patterns may be provided varying in shape according to the character of the work to be produced. In the present instance, a pattern 39 is illustrated, having a perimeter suitable to form a table arm for a chair.

To guide the pattern and limit movement of the work toward the cutter, a suitable guide may be provided, in the present instance of the invention, in the form of a disk or ring 41 (Fig. 1) secured by screw bolts 43 in a curved seat in an L-shaped bracket 45 having a dovetail 47 adapted to slide in a similarly shaped guide in a head 49 mounted on and secured to the table. The bracket may be adjusted vertically along said head by a screw 51 threaded to said bracket and confined against axial movement in an arm 53 on the top of said head. The pattern is adapted to bear against and wipe past the guide disk as the pattern and work are fed relatively to the cutter.

Next will be described the means for positively feeding the pattern and work relatively to the cutter. In the present embodiment of the invention, to accomplish this, the pattern is provided with a gear element or rack 55 (Figs. 1, 6 and 7) in the form of a flexible strip conveniently died out of sheet metal and having a series of gear teeth receiving perforations therein. The strip is adapted to be wrapped about the perimeter of the pattern, and may be nailed or otherwise secured thereto. The pattern may have a groove 59 to receive the rack, and a deeper groove 61 to receive the ends of gear teeth projecting through the perforations.

Coöperating with this rack is a suitable feed element, in the present instance, in the form of a gear 63 (Figs. 1, 7, 8 and 9) having a hub 63^a journaled in the ring 41. A collar 64 threaded on said hub is seated in a counterbore in said ring and supports said gear thereon. This gear may be driven by an intermediate gear 65 having a hub 65^a journaled in a bearing in the bracket 45, referred to. A collar 67 may be secured to said hub and rest on said bracket to support said gear thereon. The intermediate gear may be driven by a wide faced gear 69 mounted in the head 49 fast on a shaft 71 having its upper end journaled in a bearing in said head, and its lower end journaled in a bearing beneath the table carried by a U-shaped member 73 projecting from said head around the rear edge of the table. The lower end of the shaft 71 has a worm gear 75 fast thereon meshing with a worm 77 fast on a shaft 79 journaled in bearings 81 carried by the lower ends of the U-members for both units. A cone pulley 83 (Fig. 2) is mounted fast on the shaft 79, and may be driven by a belt (not shown) from any suitable source of power. The construction is such that the pattern feed transmission described for both units may be driven from the same shaft.

The work may be connected to the pattern by screws projecting through the work into the pattern, or by other suitable securing means. In some cases the work may rest on the table beneath the pattern as shown herein, and in other cases it may be more convenient to interchange the work and pattern, so that the former will be mounted on the latter, and the pattern will rest on the table. To accommodate the cutter and the feed gear 63 to these conditions, they also may be interchanged. The cutter may be confined against upward movement along the cutter shaft by a sleeve 91 engaged by an adjusting nut 93 on the shaft.

The bracket 45 may be adjusted by its screw to bring the guide ring 41 in the proper plane to bear against a portion of the pattern adjacent its rack as required. The feed gears 63 and 65 being carried by the bracket, will share in the adjustment of the latter. In the course of this adjustment, the gear 65 will slide along the wide-faced gear 69, and thus said gear will serve to transmit the drive to the pattern in its different positions.

Next will be described the means for holding the work against the cutter and for holding the pattern rack in mesh with the feed gear while the cutter is active on the work. This means, in the present instance, comprises a pin 95 (Fig. 1) secured to the pattern and adapted to project up through a hole in a foot 97 of an arm 99 having a dovetail 101 adapted to slide in a similarly shaped groove in an upright 103 on the front end of a slide 105 having a dovetail 107 (Fig. 2) projecting into a similarly shaped groove of a bar 109 mounted on a pair of brackets 111 straddling the U-shaped member for the head, and secured by screw bolts to the top of the table.

Suitable means is provided tending to shift the slide 105 rearward to press the

pattern against the guide disk 41, in the present instance, comprising a weight 113 (Fig. 1) connected by a chain 115 or other flexible member with the rear end of the slide, said chain being guided by a pulley 117 mounted on the rear end of the bar 109. The arm 99 may be vertically adjusted to slide its foot onto and off from the pattern pin 95. To facilitate this adjustment, a hand lever 119 (Fig. 1) may be fulcrumed on a stud 121 on the slide, and be connected with said arm by a pin 123 thereon projecting through an elongated slot 125 in said lever.

By the construction described, the pattern may be held against the guide disk, and the rack on the pattern may be held in mesh with the feed gear, but the pattern is free to be drawn outwardly away therefrom to disengage the rack and feed gear and interrupt the feed of the pattern at any time desired.

An important feature of the invention comprises means for automatically interrupting the feed. To accomplish this, in the present instance, a stop or cam element 127 (Figs. 1, 3, 4 and 5) is provided pivotally connected to an arm 129 projecting radially outward from a ring 131 adapted to be mounted on the pattern pin 95 beneath the foot of the arm 99. The arm 129 may be formed of relatively extensible members 133 and 135, the latter being guided on the former by guides 137, and adapted to be secured in different positions of extension by a bolt 139 in the member 135 and passing through an elongated slot 141 in the member 133. The overall length of the arm may vary according to the form of different patterns as required.

To illustrate the use of the stop means described, it may be supposed that it is desired to cut around the entire perimeter of the table arm and automatically arrest the feed on completion of this operation. To accomplish this, the stop is adjusted to its position shown at *a* in Fig. 3. The cutter then commences its cut on the work directly at one side of said stop, and the feed mechanism causes the pattern and the work to turn in a contra-clockwise direction about the axis of the pin 95, the distance of the latter from the cutter varying according to lengths of the radii passing through progressive points on the perimeter of the pattern. In the course of the rotary feed of the pattern, the stop will be carried in a contra-clockwise direction around to its position indicated by dash lines at *b* in Fig. 4, where it is brought into engagement with the guide disk. Further feed of the pattern causes the stop arm to rock from said position until the face 127ª of the stop so engages the perimeter of the pattern as to limit further rocking of the arm, as indicated in full lines at *c*. This movement of the stop permits the cutter to act on the portion of the work corresponding to the portion of the perimeter of the pattern covered by the stop in its initial position. Further feeding of the pattern will carry the stop to its position as indicated in dotted lines at *d*. This causes the stop to squeeze between the guide disk and the pattern and automatically thrust the pattern outward away from the guide disk to its position shown in dotted lines, thereby automatically disengaging the pattern rack from the feed gear, and interrupting the feed of the pattern. As the pattern moves outward, the arm 99 and the slide 105 will also move outward and lift the weight 113 somewhat. Since the desired cut throughout the perimeter of the work is now completed, the hand lever 119 may be rocked upward to disengage its foot from the pattern pin and permit the removal of the work and pattern from the machine. The work is then removed from the pattern, and the operation described repeated for the next table arm to be produced.

As stated, it is sometimes desirable to continue the feed so long as the cutter is cutting with the grain of the work, and then automatically arrest the feed, so that the pattern may be removed and presented to the cutter of the other unit which feeds in an opposite direction and is adapted to complete the cut with the grain around the remainder of the perimeter of the work. To accomplish this, the stop is adjusted to a position with respect to the pattern where it will automatically interrupt the feed of the pattern when the direction of the grain with respect to the cutter changes. After the arrest of the feed, the hand lever 119 may be rocked upward to disengage the foot of the arm 99 from the pattern pin, and then the pattern may be shifted on the table to bring its pin beneath the foot of the arm 99 of the other unit. The pattern will then be fed in the opposite direction and the remainder of the cutting operation will be performed with the grain of the work.

It will be understood that the invention is not limited to the specific embodiment shown, but that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:—

1. A machine of the character described, comprising, in combination, a pattern adapted to be connected to the work to be treated, a rotary tool for operating on the work to give the latter a contour corresponding to the contour of the pattern, an element on said pattern and an element disposed coaxially of said tool for interengagement

positively to feed the pattern and work relatively to the tool, and means yieldingly to hold the work to the tool and said elements in feeding engagement, that the pattern with one of said elements and the work may move outward away from the other element to interrupt the operation of the tool on the work and the feed of the pattern and work.

2. A machine of the character described, comprising, in combination, a shaft, a rotary tool mounted on said shaft, a gear disposed co-axially of said shaft, a pattern adapted to be connected to the work to be treated and having a rack on the periphery thereof adapted to mesh with and be driven by said gear, a sliding carrier pivotally connected to said pattern, and means coöperating with said carrier yieldingly to hold the work to the tool and the rack to the gear.

3. A machine of the character described, comprising, in combination, a table, a shaft, a rotary tool mounted on said shaft for operating on the work to be treated, a guide and a gear disposed co-axially of said shaft, a pattern for connection with the work to be treated and adapted to be supported by said table, said pattern having a rack for engagement with said gear to feed the work relatively to the tool and having a peripheral portion for engagement with said guide, means to rotate said shaft and tool, means to rotate said gear at a different speed from said tool to feed the work relatively to the tool, and means automatically to press the pattern against said guide and hold the rack in engagement with said gear and hold the work against the tool.

4. A machine of the character described, comprising, in combination, a support, a pattern for an article adapted to slide over said support, a rotary tool for operating on the article, means to rotate said tool, a feed element, interengaging parts for said pattern and feed element to positively feed the article relatively to the tool, and means automatically to interrupt the feed of the article.

5. A machine of the character described, comprising, in combination, a support, a pattern for an article adapted to slide over said support, a rotary tool for operating on the article, means to rotate said tool, a feed element, interengaging parts for said pattern and feed element to positively feed the article relatively to the tool and means automatically to disengage said interengaging parts to arrest the feed of the article at a predetermined point.

6. A machine of the character described, comprising, in combination, a support, a pattern for an article adapted to slide over said support, a rotary tool for operating on the article, means to rotate said tool, interengaging elements to positively feed the article relatively to the tool, and means automatically to interrupt the feed at a predetermined point.

7. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, a feed element, interengaging parts for said pattern and feed element to positively feed the article relatively to the tool, said feed element and tool being interchangeable according to the relation of the pattern with the article, and means to drive said feed element in its different positions.

8. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, a shaft for said tool, a carrier having a ring encircling said shaft, a feed gear for said pattern journaled in and supported by said ring, and means to drive said feed gear.

9. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, and means to feed the article relatively to the tool including a gear element for the pattern, a wide faced gear, gear means connecting the latter with said gear element, and means to adjust said gear element and gear means axially of said wide faced gear according to the position of the article.

10. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, and means to feed the article relatively to the tool including a gear element on the pattern, gear means to drive said gear element, and means to adjust said gear means axially of said tool according to the position of the article.

11. A machine of the character described, comprising, in combination, a support, a pattern for connection with an article movable over said support, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool, and a stop member moved by the pattern to a position for automatically arresting the feed of the pattern.

12. A machine of the character described, comprising, in combination, a support, a pattern for connection with an article and adapted to move over said support, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool including interengaging elements and stop means automatically moved by the pattern to a position for disengaging said elements.

13. A machine of the character described, comprising, in combination, a pattern for

an article, a rotary tool for operating on the article, means to rotate the tool, and means to feed the article relatively to the tool including interengaging elements, an arm pivotally connected to the pattern and a stop carried by said arm movable to a position for disengaging said elements to arrest the feed.

14. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, a guide for the pattern, interengaging elements to feed the pattern relatively to the tool, and a cam stop automatically moved by the pattern between the latter and said guide to disengage said feed elements.

15. A machine of the character described, comprising, in combination, a support, a pattern for connection with an article, and adapted to move over said support, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool, and means for automatically arresting the feed of said pattern at any predetermined point in the feed thereof.

16. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool, and an extensible arm pivotally connected to the pattern having a stop for automatically interrupting the feed of the pattern.

17. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool, and an automatic stop for the feed movable along the periphery of the pattern to allow operation of the tool throughout the perimeter of the article.

18. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, means to feed the pattern and article relatively to the tool, a guide for the pattern, and a stop moved by the pattern between said guide and pattern to arrest the feed, said stop being moved by the guide relatively to the pattern prior to entrance between them to allow operation of the tool on the portion of the article adjacent said stop.

19. A machine of the character described, comprising, in combination, a pattern for an article, a rotary tool for operating on the article, means to rotate the tool, means to vary the elevation of the tool, and interengaging elements to positively feed the pattern and article relatively to the tool one of said elements being coaxial with said tool.

20. A machine of the character described, comprising, in combination, a table, a shaft projecting above said table, a tool on said shaft, means to adjust said shaft to vary the position of the tool with respect to said table, a pattern for an article movable over said table relatively to said tool, and interengaging elements to positively feed the pattern and article relatively to the tool, one of said elements being coaxial with said tool.

21. A machine of the character described, comprising, in combination, a pair of rotary tools, means to rotate the same, pattern means for an article movable to present the latter alternatively to said tools at will, separate oppositely driven feeding devices associated with said tools and cooperating with said pattern means to feed the article relatively to the tools, and stop means for automatically arresting the feed of the pattern by either of said devices.

22. A machine of the character described, comprising, in combination, a pair of rotary tools, means to rotate the same, feed means associated with each of said tools working in opposite directions, a pattern for a wooden article movable at will to present the latter to either of said tools according to the direction of the grain of the article, and stop means for automatically arresting the feed means when the direction of the grain of the article changes with respect to the tool.

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

RAYMOND D. EMERY.