Jan. 5, 1932. F. SCHIMMEL 1,839,599

WOODWORKING MACHINE

Filed Dec. 14, 1929 3 Sheets-Sheet 1

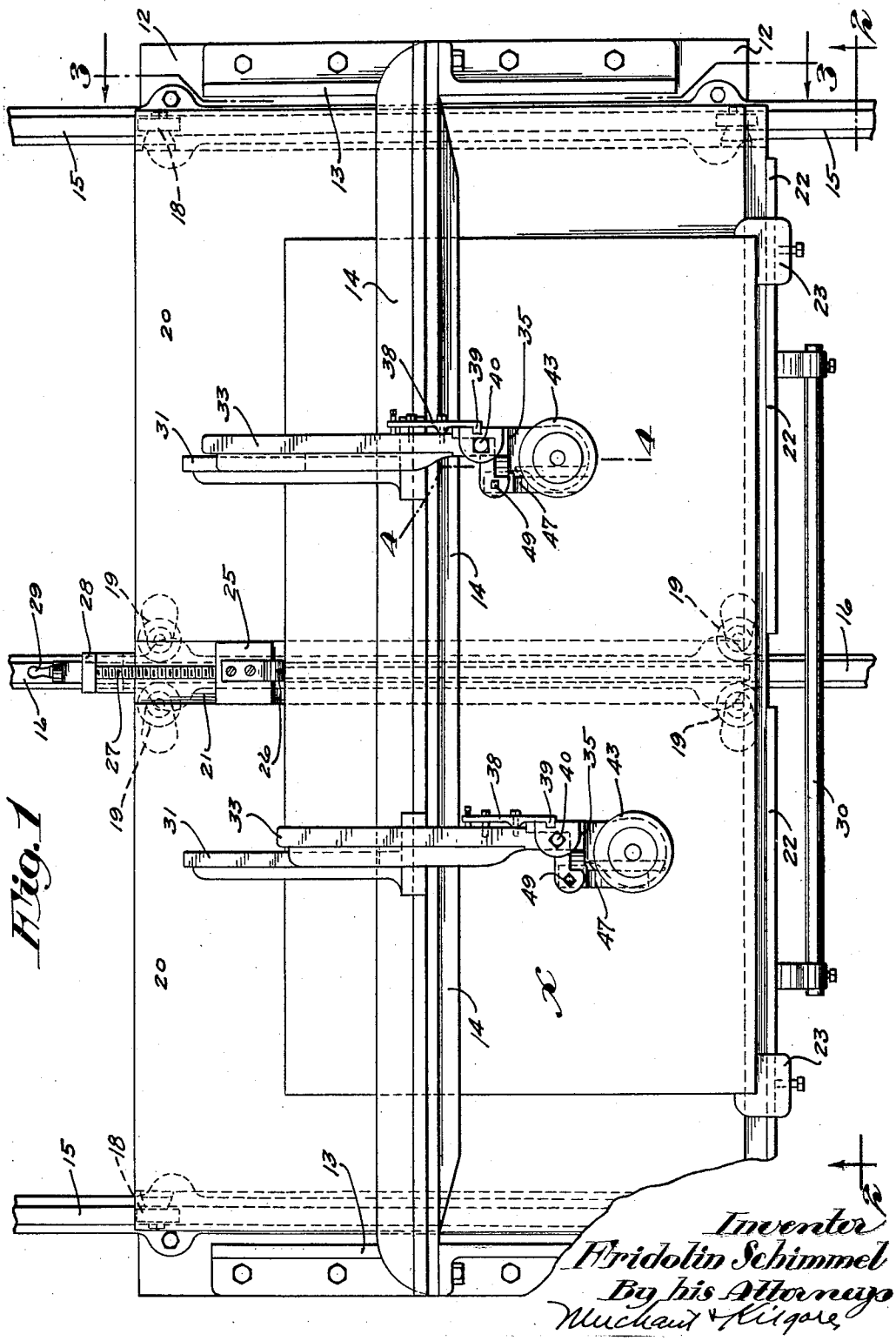


Fig. 1

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Jan. 5, 1932. F. SCHIMMEL 1,839,599

WOODWORKING MACHINE

Filed Dec. 14, 1929 3 Sheets-Sheet 2

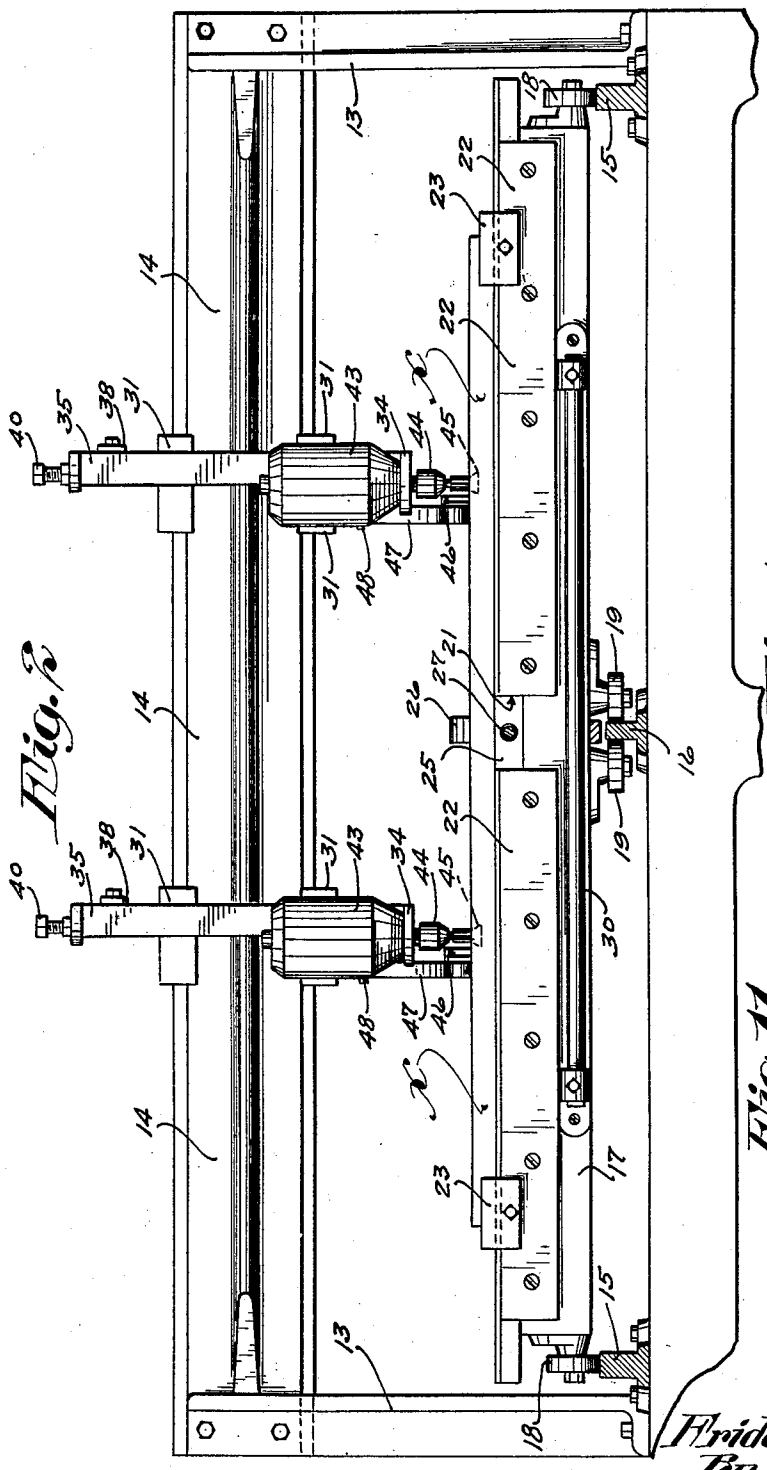


Fig. 9

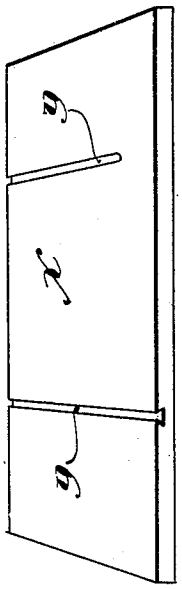


Fig. 10

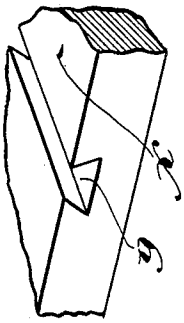


Fig. 11

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Jan. 5, 1932. F. SCHIMMEL 1,839,599

WOODWORKING MACHINE

Filed Dec. 14, 1929 3 Sheets-Sheet 3

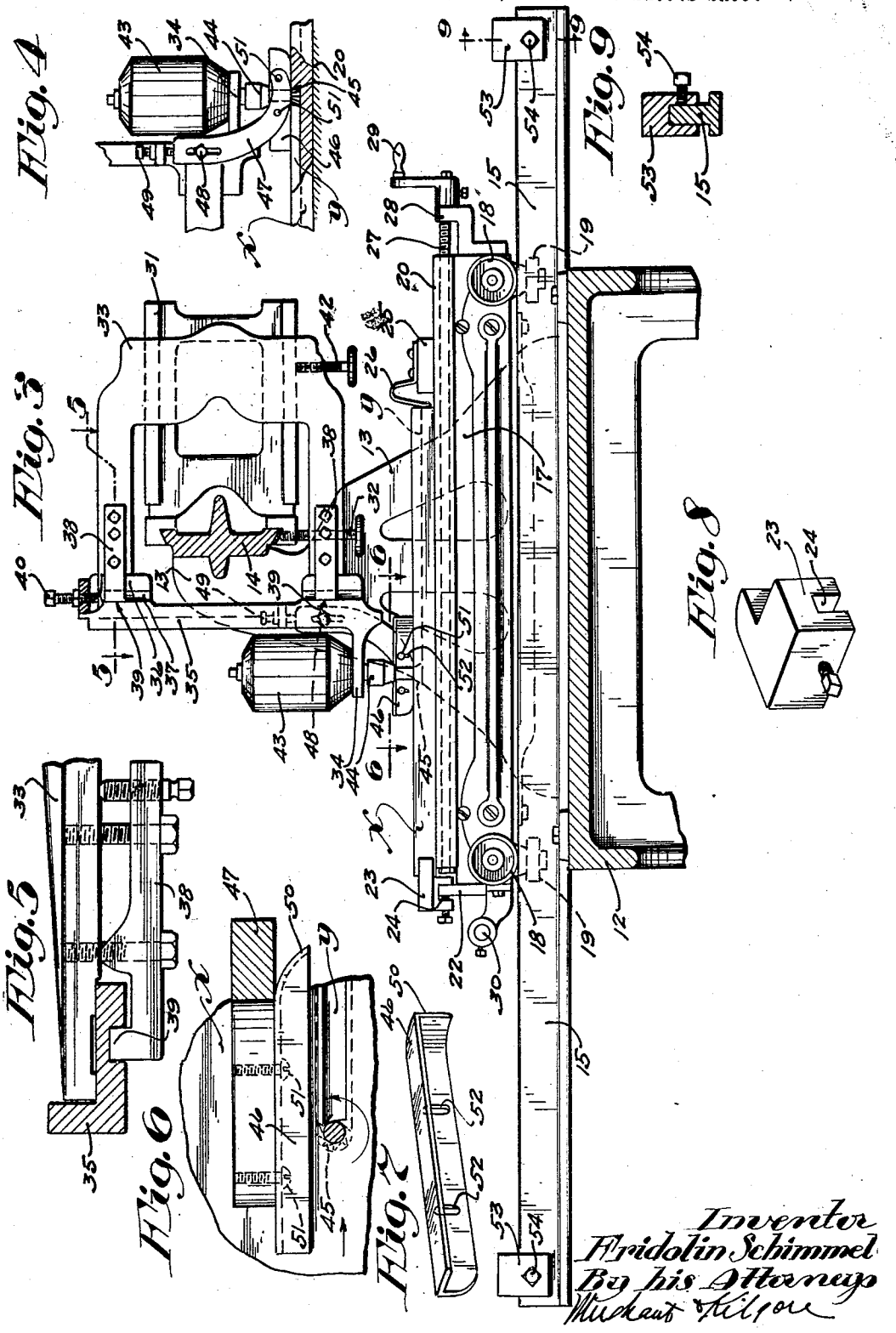


Fig. 4

Fig. 3

Fig. 5

Fig. 6

Fig. 7

Fig. 9

Fig. 8

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UNITED STATES PATENT OFFICE

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WOODWORKING MACHINE

Application filed December 14, 1929. Serial No. 414,154.

My present invention has for its object the provision of a simple and highly efficient wood working or routing machine for general use but especially well adapted for use in cutting grooves for tenons or tongues in a piece of work and more particularly a groove having contracted sides to receive a tenon having flaring sides for forming a dovetail joint between two members.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a plan view of the wood working machine with some parts broken away and other parts indicated by broken lines;

Fig. 2 is a view principally in front elevation with some parts sectioned on the line 2—2 of Fig. 1;

Fig. 3 is a view partly in elevation and partly in section taken on the irregular line 3—3 of Fig. 1;

Fig. 4 is a fragmentary view in side elevation with some parts sectioned on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary detail view with some parts sectioned on the line 5—5 of Fig. 3, on an enlarged scale;

Fig. 6 is a fragmentary detail view with some parts sectioned on the line 6—6 of Fig. 3, on an enlarged scale;

Fig. 7 is a perspective view of one of the presser feet, on an enlarged scale;

Fig. 8 is a perspective view of one of the work positioning and holding blocks, on an enlarged scale;

Fig. 9 is a detail view principally in section taken on the line 9—9 of Fig. 3;

Fig. 10 is a perspective view of a finished piece of work removed from the machine, on a reduced scale; and

Fig. 11 is a fragmentary perspective view of the piece of work, on an enlarged scale.

The numeral 12 indicates a frame having at its ends a pair of upright cast brackets 13 which carry therebetween a fixed horizontal cross rail 14. Mounted on the top of the frame 12, under the cross rail 14, is a pair of end rails 15 and intermediate rails 16. These rails 15 and 16 extend at right angles to the cross rail 14 and each thereof is in the form of an inverted T-bar bolted to the frame 12.

A reciprocatory carriage 17 is mounted under the cross rail 14 and provided with flat faced end wheels 18 which travel on the track formed by the end rails 15. This carriage 17 is further provided with pairs of opposing flat faced wheels 19 mounted on vertical journals secured to the underside of said carriage and arranged to travel in opposite sides of the intermediate rail 16 to hold the carriage 17 for straight-line travel with its wheels 18 on the rails 15.

Mounted on the carriage 17 is a flat horizontal work support or table 20 having a way 21, in the form of a channel, in its longitudinal center. This work table 20 is provided with means for adjusting the same on the carriage 17 in a true horizontal plane, but for the purpose of this case it is not thought necessary to describe the same in detail. The front longitudinal edge of the work table 20 is spaced rearward of the corresponding edge of the carriage 17 and rigidly secured to said carriage at this edge is a rail 22 which extends above the top of said table. Mounted on the rail 20 is a pair of work positioning and holding angle blocks 23 having in their undersides grooves 24 into which said rail extends, and supports said blocks for independent straight line movement. Set-screws in the blocks 23 are arranged to impinge against the rail 22 and hold the blocks where set.

Cooperating with the blocks 23 for holding a piece of work X on the table 20 is a slidable block 25 mounted in the way 21 and having a vertically disposed rear spring finger 26 arranged to yieldingly engage the piece of work at its rearward longitudinal edge midway between the ends thereof. The block 25 may be adjusted in the way 21 and held where set by a long feed-screw 27 having threaded engagement therewith and journaled in a bearing on the table 20 at the front thereof and in a bearing 28 on the rear longitudinal edge

of the carriage 17 and held against the endwise movement. The spring finger 26 permits duplicate pieces of work to be placed on the work table 20, held by the blocks 23—25 and thereafter removed without making any manual adjustments thus greatly facilitating the handling of the work.

A hand-crank 29 on the feed-screw 27 affords means by which it may be operated. On the front longitudinal edge of the carriage 17 is a hand-rail 30 by which the carriage may be manually oscillated. The angle blocks 23 hold the piece of work X against endwise and forward movements and the spring finger 26 on the block 25 yieldingly holds the work pressed forward against said blocks.

A plurality of slides 31, as shown are mounted on a way on the cross rail 14, project rearward and perpendicular thereto for independent horizontal adjustment transversely of the direction of travel of the carriage 17. As each slide 31 and all parts carried thereby are identical the one with the other the description of the one will suffice for the other. Said slide 31 is provided with a set-screw 32 arranged to impinge against the cross rail 14 and hold said slide where set.

A cross head 33 is mounted on a way on the slide 31 for horizontal sliding movement in the direction of the travel of the carriage 17. Said cross-head 33 is, as shown, in the form of a horizontally disposed yoke, the transverse portion of which is mounted on the slide 31 with its arms projecting forward with the cross rail 14 midway therebetween.

The cross head 33 is provided with a floating motor support 34 in the form of a forwardly projecting horizontal shelf on the lower end of an upright angle hanger bar 35 having at its ends a pair of rearwardly projecting extensions 36 provided with vertically aligned grooves 37. Adjustable horizontal clamping jaws 38 are fulcrumed on the arms of the cross head 33 for cooperation with said arms to connect thereto the hanger bar extensions 36, which extend therebetween. The jaws 38 have on their front ends lugs 39 which extend into the grooves 37 with a working fit and normally hold the bar 35 and hence the motor support 34 for straight floating line movement above the table 20. By tightening the clamping jaws 38 the bar extensions 36 may be frictionally secured to the cross head 33 in case it is desirable to rigidly hold the motor support 34 against vertical movement in respect to the work table 20. A micrometer screw 40 has threaded engagement with a horizontal bearing lug on the hanger bar 35 and its upper extension 36 and when there is no work on the table 20 said screw impinges against the longitudinal edge of the upper arm of the cross head 33 and holds said hanger bar and all parts carried thereby suspended from the cross head 33 and out of contact with the table 20. A set-screw 42 having threaded engagement with the cross head 33 and impinging against the slide 31 is provided for holding said cross head where adjusted on said slide.

An electric motor 43 is mounted on the support 34 and its shaft extends vertically downward through an aperture therein and is provided with a chuck 44 for holding a routing tool or periphery cutter 45 with its axis perpendicular to the work table 20. At the left-hand side of the cutter 45 is a combined gauge and presser foot 46 which extends both forward and rearward of said cutter and rests on the work X to hold the same on the table 20 and governs the depth of the groove cut by the tool 45. This presser foot 46 is integral with the lower end of a downwardly and forwardly curved leg 47 carried by the hanger bar 35 for common vertical movement with the cutter 45. The leg 47 is rigidly but adjustably secured to the hanger bar 35 by a set-screw 48 which extends through a vertical slot in said leg and has threaded engagement with the hanger bar 35.

A micrometer screw 49 is provided for making the final adjustment of the presser foot 46 on the hanger bar 35 in respect to the cutter 45 and positively holds said presser foot against movement toward said cutter 45 under the weight of the load it sustains when resting on the work X. This micrometer screw 49 has threaded engagement with a lug integral with the hanger bar 35 above the leg 47 and impinges against the upper end of said leg, see Fig. 4.

By reference to Fig. 4 it will be noted that the under side of the presser foot 46 is upwardly curved both forwardly and rearwardly from the cutter 45 and its work-engaging surface or crown is at the axis of said cutter.

A guard 50 is provided for directing shavings thrown by the cutter 45 away from said cutter and prevent the same from getting under the presser foot 46, which acts as a depth gauge for the cutter 45, and thereby lift the same from the work X and cause the cutter 45 to form a groove having a varying depth. This guard 50 is between the presser foot 46 and cutter 45, extends parallel to said foot and is secured to the adjacent face thereof by a pair of horizontally spaced screws 51 which loosely extend through a pair of parallel vertical slots 62 in said guard and have threaded engagement with the presser foot 46. Said guard 50, as shown, has on its upper longitudinal edge a horizontal outstanding flange and its rear end portion is curved laterally away from the presser foot 46 to direct the shavings away from the cutter 45. The screws 51 loosely hold the presser foot 46 so that the same is free for raising,

lowering and angular movements in respect to the work X and said presser foot.

The cutter 45, shown, is for cutting a groove Y of a constant depth, having contracted sides to receive a tenon having flaring sides to connect two pieces of work by means of a dovetail joint. By substituting other cutters for the cutters 45, grooves having straight sides may be cut in a piece of work. The adjustment of the cross heads 33, as shown, is such that the left-hand cutter 45 will cut a groove the full width of the work X and the right-hand cutter 45 will cut a groove only part way through the work, see Fig. 10.

By adjusting the slides 31 on the cross rail 14, grooves may be cut any desired distance apart and from the ends of the work and by adjusting the cross heads 33 on the slides 31, grooves may be cut completely through the work or only part way therethrough. Any desired number of cutters may be employed and each thereof independently adjusted. By vertically adjusting the leg 47 on the hanger bar 35 the presser foot 46 may be set different distances above the cutter 45 to vary the depth of a groove to be cut in the work by said cutter. As previously stated, when there is no work on the table 20 the screw 40 impinges against the cross head 33 and supports the hanger bar 35 and all parts carried thereby from said cross head with the cutter 45 above and out of contact with the work table 20.

To cut a groove in a piece of work the carriage 17 is moved into a position in which said work may be secured thereto forward of the cutter 45 and said work secured to the work table 20 by the blocks 23 and the spring 26 and the cutter 45 adjusted in a horizontal plane by manipulating the slide 31 and cross head 33. The screw 40 is also operated to position the presser foot 46 a distance above the work table 20 which is less than the thickness of the piece of work. The work is then fed to the cutter 45 by taking hold of the handle bar 30 and moving the carriage 17 rearward. During this movement of the carriage 17 the presser foot 46 first engages the piece of work and lifts the hanger bar 35 and all parts carried thereby and automatically positions the cutter 45 to cut a groove in the work of a predetermined depth.

The depth to which the groove is to be cut corresponds to the distance from the under side of the presser foot 46 to the lower end of the cutter 45 and, as previously stated, this depth may be varied by adjusting the leg 47 on the hanger bar 35. As the presser foot 46 moves upward on the work, as said work is fed to the cutter 45, said presser foot lifts the hanger bar 35 and all parts thereby and positions the screw 40 in said hanger bar above the cross head 33 so that said hanger bar is supported from the work by the presser foot 46 and is free to float vertically as the work is fed under the presser foot 46. As the presser foot 46 and all parts carried thereby is free for vertical movement said presser foot will follow the contour of the upper face of the work and thereby cause the cutter 45 to cut a groove of constant depth in the work.

During the movement of the piece of work under the presser foot 46 the guard 50 is free to move in respect to said presser foot and slide on the work and move in respect thereto. Front and rear adjustable stops 53 on the side rails 15 limit the reciprocating movement of the carriage 17. These stops 53 are held in different longitudinal adjustments on the rails 15 by set-screws 54, which have threaded engagement with said stops and impinge against said rails.

As previously stated, one or more of the cutters 45 may be used depending on the number of grooves to be simultaneously cut and when a cutter is not being used the same may be set above the work by loosening the jaws 38 moving the hanger bar 35 vertically upward and thereafter securing the same by tightening said jaws.

What I claim is:

1. In a machine of the class described, a work support and a tool support, one of which is relatively movable horizontally, a groove cutting tool on the tool support, a way in which the tool support is mounted for free vertical movement over the work support, a presser foot on the tool support arranged to rest on a piece of work on the work support, support the tool support and cutting tool therefrom for raising or lowering movements and follow the contour of the piece of work during the cutting of a groove therein by the tool and cause said tool to cut the groove at the same depth, and a stop for limiting the movement of the tool support toward the work support and normally hold the same suspended with the presser foot spaced a distance above the work support that is less than the thickness of the piece of work, said presser foot being arranged to engage the piece of work as the same is fed thereto with a cam action to lift the presser foot onto the work.

2. The structure defined in claim 1 in which said stop is adjustable to vary the position of the presser foot above the work table for pieces of work of different thicknesses.

3. In a machine of the class described, a horizontal work support and a tool support, one of which is relatively movable horizontally, a groove cutting rotary tool mounted on the tool support to turn about a vertical axis, said tool support being mounted for vertical movement over the work support, and a presser foot on the tool support at one side of the tool, said presser foot having a cam surface and rearward thereof a substantially flat work

engaging surface the length of which is substantially the same as the diameter of the cutting tool, said tool support normally holding the presser foot with its work engaging surface below the upper surface of a piece of work on the work support, whereby the cam surface on the presser foot will be engaged by the work during its feeding movement and lift the presser foot, and hence, the tool and tool support and position the work supporting surface of the presser foot on said work prior to the initial cut made therein by the tool.

4. The structure defined in claim 3 in which the cutter of the tool is relatively wide and in which said cutter is vertically adjustable in respect to the work support to carry its upper end variable distances above the work supporting surface of the presser foot to vary the depth of a cut to be made by the cutter.

5. The structure defined in claim 3 which further includes a dust guard attached to the presser foot for horizontal movement therewith and slide on the work, the connection between the dust guard and presser foot permitting relative angular movements in planes perpendicular to the work support.

6. In a machine of the class described, a horizontally movable work support, a tool support, a way in which the tool support is mounted for free vertical movement over the work support, said way being mounted for adjustment in the direction of the movement of the work support and transversely thereof, a groove cutting rotary tool mounted on the tool support to turn about a vertical axis, and a presser foot on the tool support at one side of the tool, said presser foot having a cam surface and rearward thereof a substantially flat work engaging surface the length of which is substantially the same as the diameter of the cutting tool, said tool support normally holding the presser foot with its work engaging surface below the upper surface of a piece of work on the work support, whereby the cam surface on the presser foot will be engaged by the work during its feeding movement and lift the presser foot, and hence, the tool and tool support and position the work supporting surface of the presser foot on said work prior to the initial cut made therein by the tool.

7. In a machine of the class described, a horizontally movable work support, a plurality of tool supports, ways in which the tool supports are mounted for independent free vertical movements over the work support, a groove cutting rotary tool mounted on each tool support, said ways being independently adjustable in the direction of the movement of the work support, whereby the cutting tools may be positioned to simultaneously cut grooves in a piece of work on the work support of the same length or to simultaneously cut grooves in said work of different lengths, and a presser foot on each tool support at one side of its tool, said presser foot having a cam surface and rearward thereof a substantially flat work engaging surface the length of which is substantially the same as the diameter of the cutting tool, said tool support normally holding the presser foot with its work engaging surface below the upper surface of a piece of work on the work support, whereby the cam surface on the presser foot will be engaged by the work during its feeding movement and lift the presser foot, and hence, the tool and tool support and position the work supporting surface of the presser foot on said work prior to the initial cut made therein by the tool.

In testimony whereof I affix my signature.

FRIDOLIN SCHIMMEL.