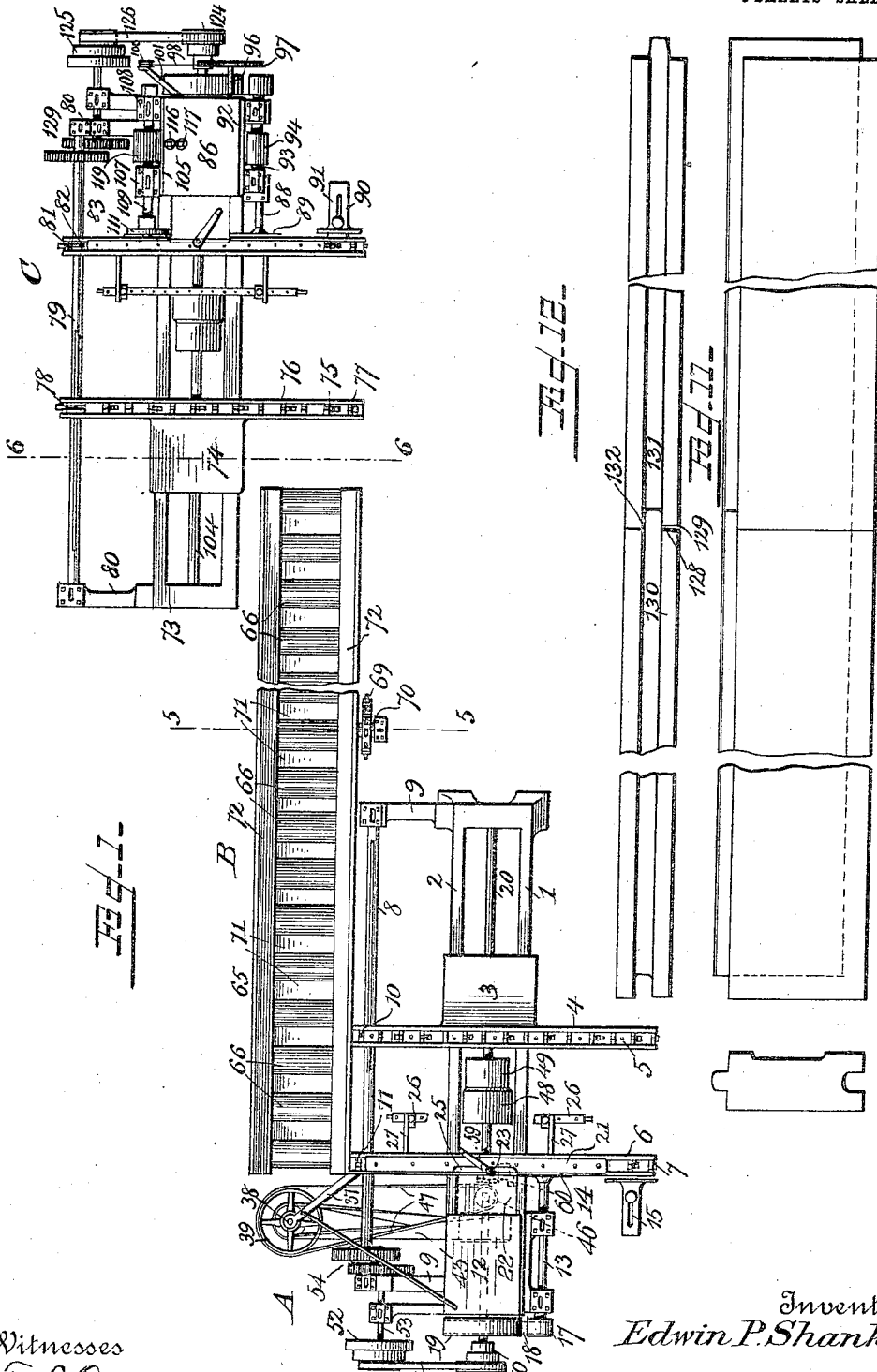


E. P. SHANK.
WOODWORKING MACHINE.
APPLICATION FILED APR. 8, 1909.

942,940.

Patented Dec. 14, 1909.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 13.

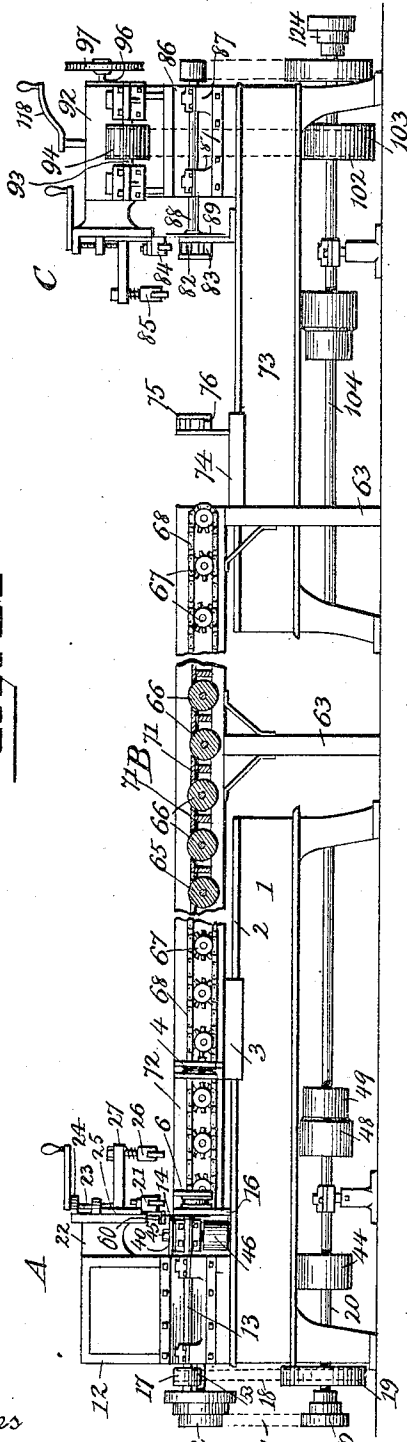


Fig. 13.

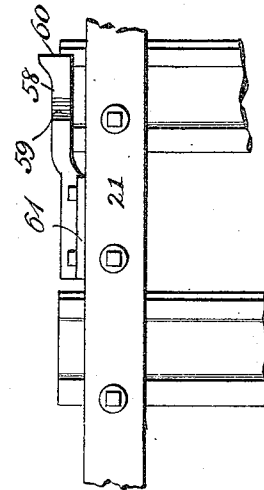
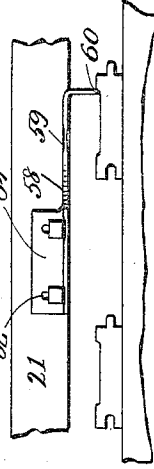


Fig. 14.



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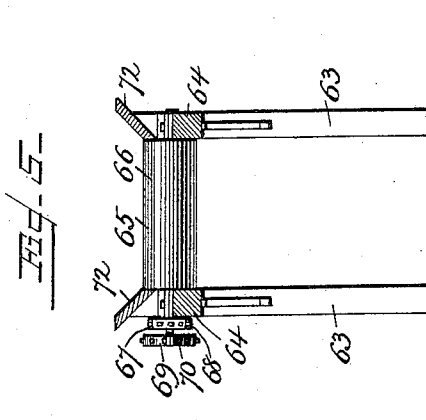
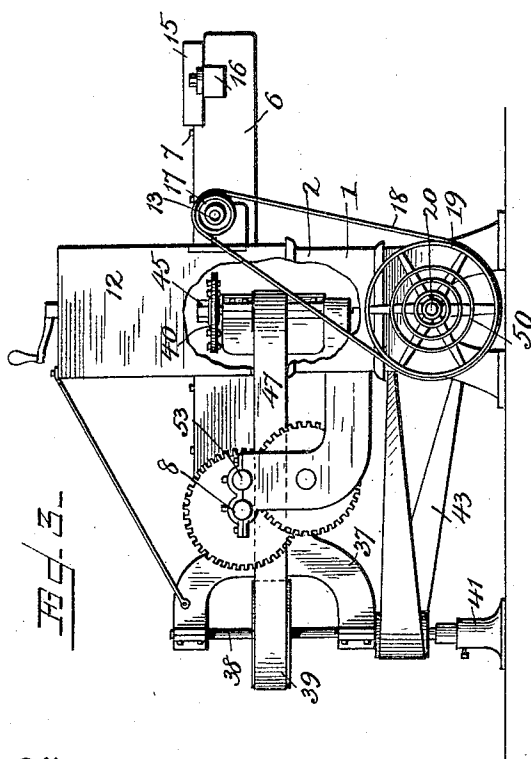
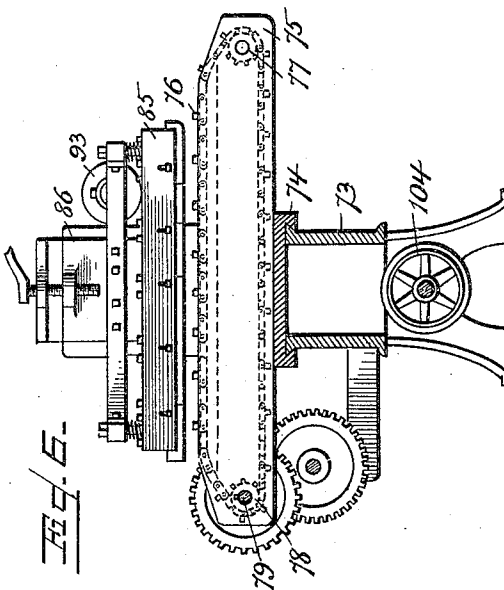
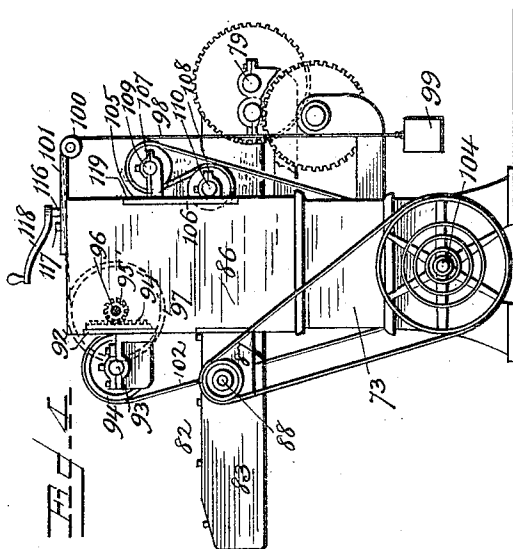
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4 SHEETS—SHEET 3.



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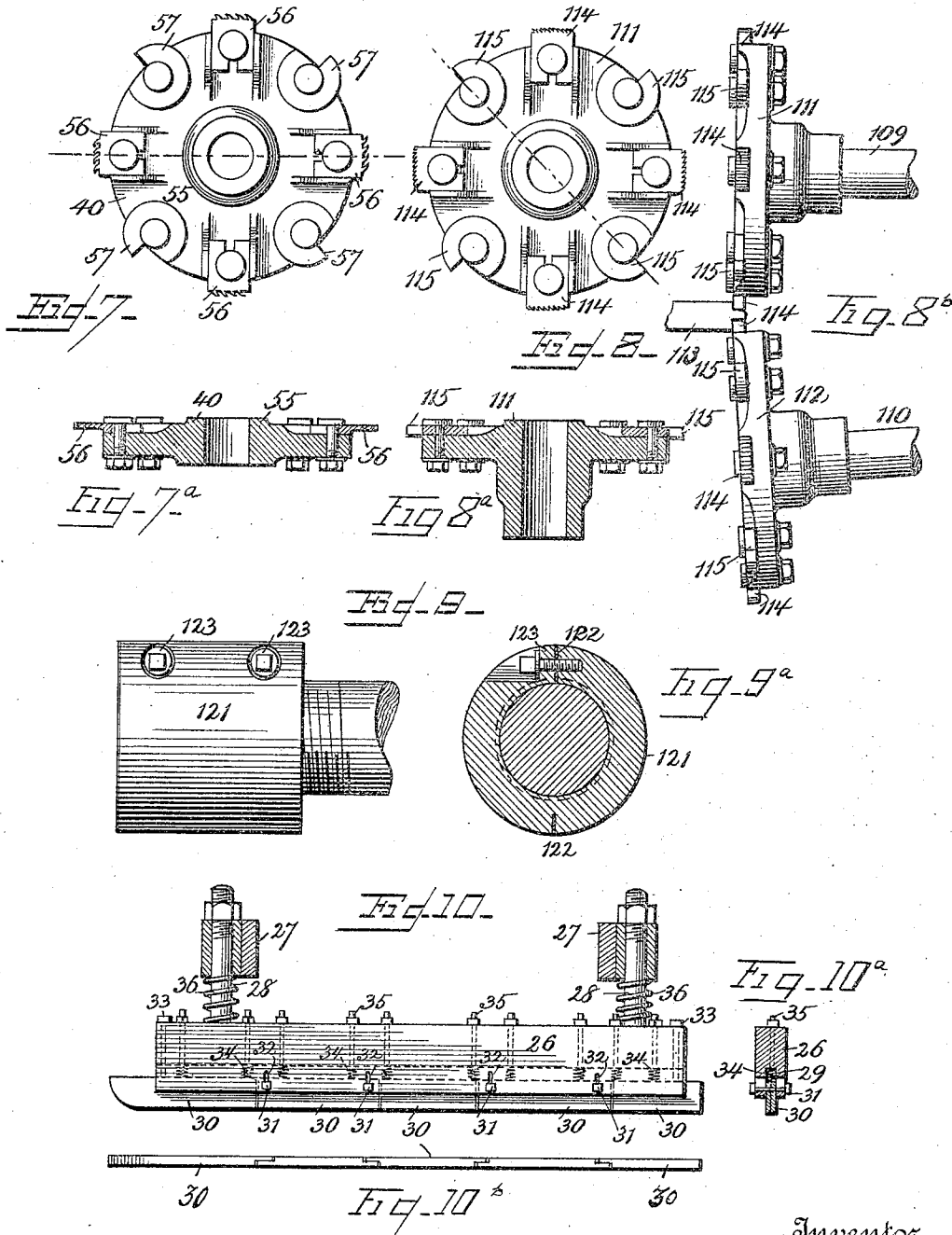
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UNITED STATES PATENT OFFICE.

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WOODWORKING-MACHINE.

942,940.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed April 8, 1909. Serial No. 488,682.

To all whom it may concern:

Be it known that I, EDWIN P. SHANK, a citizen of the United States, residing at Wells, in the county of Delta and State of Michigan, have invented certain new and useful Improvements in Woodworking-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to wood working machines and particularly to that type which are known as end matchers adapted for the purpose of dressing ends of boards of any character.

This particular type of machine which will be minutely described hereinafter, is constructed to dress, tongue and groove the ends of boards so that their mating edges will be equally level at the ends as at the sides.

Another object of this invention is to provide a machine of this character whereby the labor and expense of sawing off and squaring flooring strips and any boards or wood strips needing square ends may be saved at the place of construction where said strips are used.

A further object is to provide a machine for making a groove in one end of flooring or other wood strips and a tongue or tenon on the other so that the groove in one end will fit the tenon on the mating piece and will hold both surfaces at the ends perfectly smooth and level and to provide a machine which will perform this character of work without moving or changing the distance between the cutter heads lengthwise of the machine thereby enabling the operator to place a piece of material in the machine of any length and continuously feeding a number of such strips without regard to their length, thereby saving the expense of trimming and waste of lumber by having stocks of equal length.

A further object is to provide a machine which will trim both ends of the flooring strips, groove one end with a taper or wedge shaped groove, finish the under side of the strips, tenon or tongue the opposite ends of said strips to fit the groove of adjoining strips in such a manner that when flooring is

laid, the joints will be perfectly square and the surface even.

A still further object of the invention is to provide tenon cutters which will form a tenon longer upon its under side than upon its upper side whereby the upper edges of the adjoining or mating pieces of timber will engage with each other and a suitable leeway will be allowed on the under side.

Broadly speaking, the invention consists in a machine so arranged that without moving or changing the distance between the cutter heads lengthwise of the machine, the operator may insert a strip therein of any length and have the machine square the ends, end groove the same and dress the splinters from the end of the strip being worked and discharge it into a conveyer which carries it to the opposite or other end of the machine where a second operator places it on a continuous cog table which passes it through mechanism squaring that end and cutting the tenon or tongue thereon which is adapted to mate with the groove just made on the other pieces, and to cut said tenon so that a suitable leeway is provided on the under side of the board.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a top plan view of an entire machine with parts broken away and parts omitted to better show the construction thereof; Fig. 2 is a side elevation having also certain parts omitted and parts broken away; Fig. 3 is an end elevation of the grooving end of the machine; Fig. 4 is an end elevation of the tenoning end of the machine; Fig. 5 is a detail sectional view on the line 5—5 of Fig. 1; Fig. 6 is a detail sectional view on the line 6—6 of Fig. 1; Fig. 7 is a detail plan view of the grooving head; Fig. 7^a is a section of the same; Fig. 8 is a detail plan view of one of the tenoning heads; Fig. 8^a is a sectional view of the same; Fig. 8^b is a side elevation of the tenoning heads shown in active position; Fig. 9 is a detail elevation on an enlarged scale of the arbor end thrust bearing for the tenoning head shafts;

Fig. 9^a is a section of the same; Fig. 10 is a detail elevation of the sectional hold down employed to hold the metal in place; Fig. 10^a is a detail section of the same; Fig. 10^b is a bottom plan view of a sectional thrust bar feet arranged in coöperative position. Fig. 11 is a side elevation of the flooring strip showing the work done by the machine; Fig. 12 is an edge elevation of two mating boards jointed together; Fig. 13 is a detail top plan view of the scraper shown attached to the presser bar; and Fig. 14 is a detail side elevation of the scraper removed from the presser bar and shown in connection with a flooring strip.

In the specific embodiment illustrated, the machine is shown as constructed of three sections, the grooving section A, a conveying section B and the tenoning section C. While for convenience, these parts shall be described separately and in their respective order, it is to be understood that they constitute one machine in its entirety and not a combination of machines, as would naturally be supposed. In the section A the base or support 1 is shown provided with the usual table 2 upon which the work carriage 3 is adapted to slide. This carriage comprises a chain block or guide way 4 in which the feeding chain 5 is adapted to travel. This carriage may be moved backward and forward over the table 2 as is customary in lathe structures, for the purpose of accommodating the machine to different lengths of stock, it being more preferable to work certain lengths or stock of proximating lengths than to work stock of miscellaneous lengths at the same time. While both methods are adaptable and could be employed, without any change, the former method is considerably more rapid. Secured to the table 2 and spaced a considerable distance from the chain block 4 is a similar chain block 6 stationary with the frame, in which runs a similar chain 7 to the one numbered 5 and being driven from the same shaft 8, which latter part is journaled in extension arms 9 projecting laterally from the side of the base 1 and carrying the sprocket wheels 10 and 11 for the chains 5 and 7, respectively. The sprocket 10 is keyed or splined on the shaft 8 and is held between the sides of the chain block 4 so that any movement of the carriage 3 carries the sprocket with it and therefore insures a continuous operation of the chain 5 in conformity with the chain 7.

Arranged adjacent the chain block 6 upon the table 2 is a cutter frame 12, in which is journaled a saw shaft 13 having on its end the circular squaring saw 14 adapted to be positioned closely adjacent the chain block 6. This saw is adapted to cut-off and square the end of the material which is gaged by

a suitable gage plate 15 supported upon an arm 16 projecting outwardly from the base 1. The outer end of the shaft 13 is provided with a belt pulley 17 adapted to be connected by a belt 18 with the pulley 19 on a driving shaft 20.

In order that the material may be held in proper position to be operated upon by the saw and the cutter bar to be hereinafter described, I provide a presser bar 21 which is adjustably supported upon an extension 22 of the frame 12 and is moved upwardly or downwardly by a hand-operated screw 23 swiveled in a lug 24 on the extension 22. This presser bar is carried by a suitable frame 25 slidably mounted in suitable guides 26 upon the extension and carries what will be hereinafter described as a sectional hold down 26. This hold down 26 is supported upon horizontally extending arms 27 which are slotted to receive the supporting bolts 28 whereby any sliding movement of the presser bar 26 will not displace the arms 27. The bolts 28 are rigidly connected to the presser bar 26 which consists of a U-shaped casting with the longitudinal slot 29 formed therein, in which the spring pressed feet 30 are carried. These feet are pivoted together by bolts 31 which pass through the overlapping ends thereof and through the vertical slots 32 formed in the presser bar 26 and are held from displacement when the machine is empty by suitable bolts 33 arranged at the end of the bars. Each foot 30 is provided at its end with a pressure spring 34 which may be adjusted by the plugs 35 to increase or lessen the tension of the feet upon the work. This sectional hold down or presser bar is used for the purpose of accommodating the varying thicknesses of boards as they are passed through the machine and in order to provide for accidents, I surround the bolts 28 between the arms 27 and the bar 26 with heavy spiral springs 36 which are operated when any miscarriage of work occurs such as two boards passing through the machine, one on top of the other.

Extending outwardly from the base 1 is a bearing arm 37 which is bifurcated at its end to receive the belt shaft 38 upon which the driving pulley 39 is carried for driving the cutter head 40. This driving shaft extends below the lower leg of the bifurcated arm 37 where it is seated in an adjustable floor bracket 41. The shaft is provided intermediate the lower leg of the bifurcated arm 37 and the bracket 41 with a pulley 42 which is driven by the belt 43 connected to the shaft 20 by the pulley 44.

Journaled vertically in the frame 12 below the extension 22 is a vertical shaft 45, upon the upper end of which is keyed the cutter head 40 and upon the lower end of

which is secured a pulley 46 which is driven by the pulley 39 through the belt connection 47. The shaft 20 is also provided with a main driving pulley 48 and an idler 49 to which the driving belt may be thrown when it is desired to stop the grooving end of the machine, and is also provided with a series of cone pulleys 50 through which the shaft 8 is driven by means of a belt connection 51 with the cone pulleys 52 on the shaft 53. The shaft 53 is connected by a suitable set of gears 54 to the shaft 8 when by the speeding of the latter may be changed to suit the work in hand.

The cutter head is shown in Fig. 2 as arranged horizontally and in Fig. 7 it is shown in detail in section and in plan view. This grooving head comprises a circular disk or wheel 55 with a series of four saw-tooth cutters 56 arranged at equal distances apart there-around and a series of edge dressers 57 arranged intermediate the cutters 56. The cutters 56 are adapted to gouge out and groove the end of the flooring strip or other plank and the cutters 57 are adapted to clean and dress the edges of the groove.

It will be well understood by all those versed in the art that the under side of the plank or strip after being cut is invariably filled with a bur of splinters. In order to properly dress the end after squaring with the circular saw 14, it is necessary to remove this roughness from the board. In order to accomplish this in the general operation, I provide a scraper 58 composed of spring steel or the like and ground thin at 59 whereby its scraping end 60 may have sufficient movement to conform to the contour of the board on its under side and thereby prevent any rupture of the main body of the spring. This scraper 58 has a right angular extension 61 slotted at 62 so as to be adjustably secured to the rear side of the presser bar 21.

I will now proceed to describe the intermediate section B. It is in this portion of the machine that the material is received from the grooving section and conveyed to the tenoning section C, and it will be noticed that the material travels in the direction of its length through the grooving section and in a direction longitudinal with its length in the conveying section, B, and again transfers to its longitudinal direction in the tenoning section C. Suitable standards 63 are provided for supporting the frame work or side members 64 of the conveyer 65 which in this instance comprises a series of separated rolls 66 journaled in the side members 64 and each provided with a sprocket wheel 67 on one end of their supporting shafts, which is engaged by a chain 68 driven by the main sprocket wheel 69 on the driving shaft 70. These rollers are

preferably arranged about nine inches apart throughout the length of the frame and have positioned in between them short tables 71 which prevent short lengths of material from falling therethrough. The sides of the conveyer have extending outwardly therefrom the inclined guide pieces 72 which prevent the material from rolling off and cause it to travel in a straight direction from the section A to the section C. It may be well to state here, at this point, that two operators are necessary to control and operate the machine, one at the section A for the feeding of the material to the grooving portion of the machine and one at section C to feed the material to the tenoning heads. We now have the material squared and grooved at one end and the bur taken off and the strip transmitted to the section C where it is adapted to be acted upon to form the tenon. In this section, a base 73 is shown similar to the base 1 of the section A and a carriage 74 slidable thereon similar to the carriage 3 in section A. This carriage has the usual chain block 75 with a conveying chain 76 carried upon sprockets 77 and 78, the latter being splined to the drive shaft 79 as is usual and both being arranged between the sides of the chain block 75. The shaft 79 is journaled in arms 80 arranged at either end of the base and carries the sprocket wheel 81 which is adapted to drive the chain 82 in a stationary chain block 83. Presser bars 84 and a sectional hold down 85 are shown, which are in every particular the same as the ones illustrated and described for section A.

Extending upwardly from the rear end of the base is a frame 86 which carries suitable bearings 87 in which are journaled the saw shaft 88 carrying at its forward end the usual squaring saw 89. The frame is also provided with the customary guide 90 with an adjustable guide plate 91 mounted thereon so that the material may be abutted there-against to insure a cut-off by the saw and proper engagement of the timber by the conveying chain 76 and 82.

Sliding in suitable guide-ways on the frame above the saw shaft 88 is a bearing plate 92 which carries in suitable bearings mounted thereon, the belt tightener shaft 93 with a belt pulley 94 arranged intermediate the bearings thereon. This plate is provided on its inner side with a rack face 94' adapted to be engaged by a pinion 95 carried upon a cross shaft 96 on whose end is keyed a rope sheave 97 to which is secured a cable 98 having at its free end a weight 99. The cable after passing from the rope sheave 97 passes over a pulley 100 upon an extension arm 101 carried by the upper end of the frame 86. The action of the weight 99 tends to turn the sheave 97 and through the

shaft 96 raises the plate 92 and with it the pulley 94 thereby tightening the driving belt 102 which runs therearound from the driving pulley 103 keyed to the main driving shaft 104.

On the opposite side of the frame from the adjusting plate 92, I secure in suitable vertical guide ways, the vertically adjustable plates 105 and 106 which carry on opposite sides of each, the shaft bearings 107 and 108. These bearings support and hold in proper position, the cutter head shafts 109 and 110 having on their respective ends the cutter heads 111 and 112. As shown in Fig. 8, it will be seen that the shaft 109 is arranged in a horizontal plane with the cutter head 111 operating vertically and at direct angles to the board 113 being operated upon, while the shaft 110 is arranged upon an incline and with the cutter head 112 operating at an oblique angle to the board 113.

The cutters on both of these heads 111 and 112 are similar and comprise four equidistant saw-tooth cutters 114 and four intermediate trimming cutters 115 adapted to dress the edges of the cut made by the saw toothed cutters 114. Each series of cutters are arranged upon the cutter heads adjustably, as are also the cutters 56 and 57 on the grooving head 55 so that the depth of groove may be regulated or the thickness of tenon. In order that these cutter heads be adjusted independent of the adjustment of the bits thereon, I provide a pair of screw shafts 116 and 117 which are swiveled in the frame 86 and have suitable engagement (not shown) with the plates 105 and 106. By operating either one of these threaded shafts 116 or 117 with the handle 118, the plates 105 or 106 may be raised or lowered to change the position of the cutter heads. Each of the shafts 109 and 110 are provided with pulleys 119 and 120 which are engaged by the belt 102 which passes directly through the frame in a downward direction to engage the pulley 3 and thence back over the pulley 119 and down to the drive pulley 103. These pulleys 119 and 120 are preferably provided with extension collars which are keyed to the shaft so as to form one side of a thrust bearing which holds the cutter heads in proper working position and prevents any irregularity in cut. On the opposite side of the bearings which are engaged by the collars, the shafts are threaded to receive a split collar 121 which is provided with a diametrically opposite kerf 122 which renders the collar sufficiently resilient to permit the clamping bolts 123 to draw the halves together and clamp the same upon the end of the shaft. The collars are interiorly threaded so as to be adjustable to take up any lost motion which may occur through wear. The shaft 79 is driven in the same manner as the

shaft 8 by cone pulleys 124 and 125 and connected together by a suitable belt 126 and adapted to drive the gears 129 carried upon the shaft 109.

The scraper shown in Figs. 13 and 14 is unnecessary in this section of the machine, as the lower cutter head 112 removes all burs or splinters from the end of the board. It will be noticed from a close inspection of Fig. 12 that the upper cutter 111 cuts the rabbet, forming the lower side of the tenon in a line directly at right angles to the top of the board, while the under cutter 112 which is arranged at an obtuse angle cuts a bevel edged rabbet 128, as shown, which makes longer top faces to the boards which about in practice and leave a leeway 129 between the lower edge of the boards 130 and 131. In Fig. 1, it will also be noticed that the cutter 55 makes a wedge shaped groove 132 and the cutters 111 and 112 form a slightly wedge shaped tenon 133. This makes a tight fit and the cut before mentioned insures the positive and even abutment of the boards on their wearing surface. The right angular cut makes the boards 130 and 131 engage each other from the upper wearing surface to the tenon so that after the boards are placed together, if planing of the floor surface is necessary no more of a joint than was originally apparent, will be revealed, while the under edges of these boards have a relatively large space in between.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new is:

1. A machine of the class described, comprising a continuously moving feed table, a gage to determine the position of the material on the table, means for squaring the end of the material, means to hold the material on the table, a scraper carried by the holding means to dress the bur formed by the squaring means, and means to match the ends of the material.

2. A machine of the class described, comprising a continuously moving feed table, a gage to determine the position of the material on the table, means for squaring the end of the material, means to hold the material on the table, a spring scraper adjustably mounted on the holding means to dress the bur formed by the squaring means, means

to match the ends of the material, and means to adjust one portion of the table.

3. A machine of the class described, comprising a base, a two-part continuously moving table mounted on said base, a shaft to drive both parts simultaneously, means for sliding one part of said table on the shaft, whereby it is adjustable toward and away from the other part, a gage to determine the position of the material on the table, means for squaring the ends of the material, means to hold the material on the table, a spring

scraper adjustably mounted on the holding means to dress the bur formed by the squaring means, means to match the ends of the material.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWIN P. SHANK.

Witnesses:

C. W. MOLIN,
H. H. SHEPECK.