

April 6, 1937.

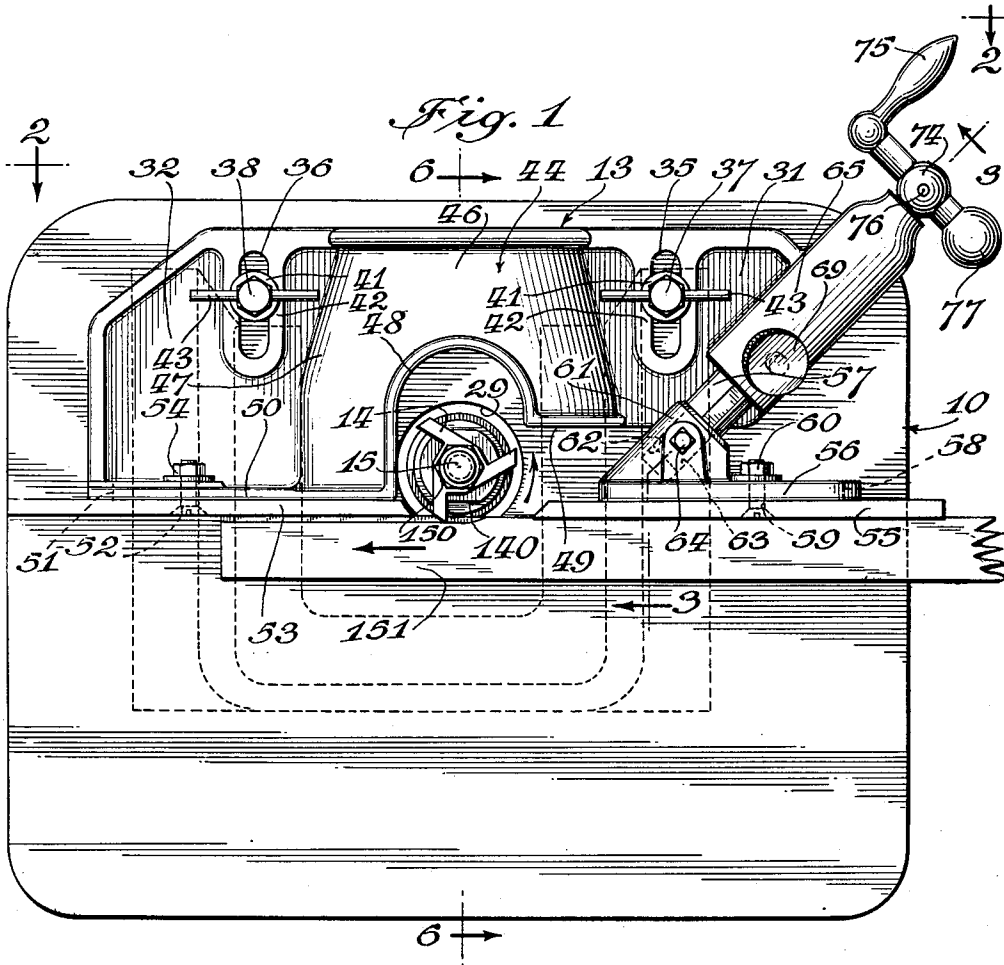
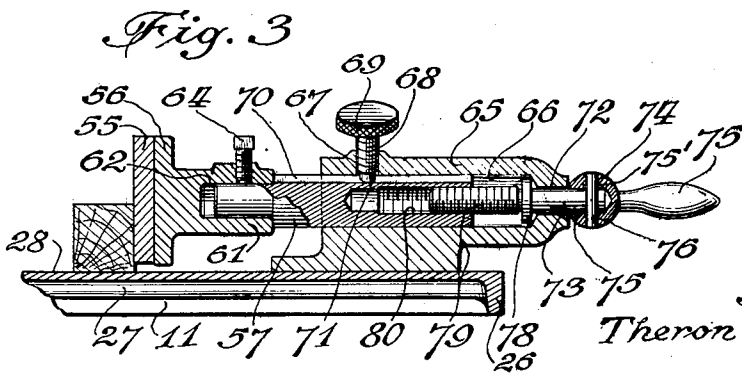
T. L. HEDGPETH

2,076,511

WOODWORKING TOOL

Filed May 2, 1935

3 Sheets-Sheet 1



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WOODWORKING TOOL

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3 Sheets-Sheet 2

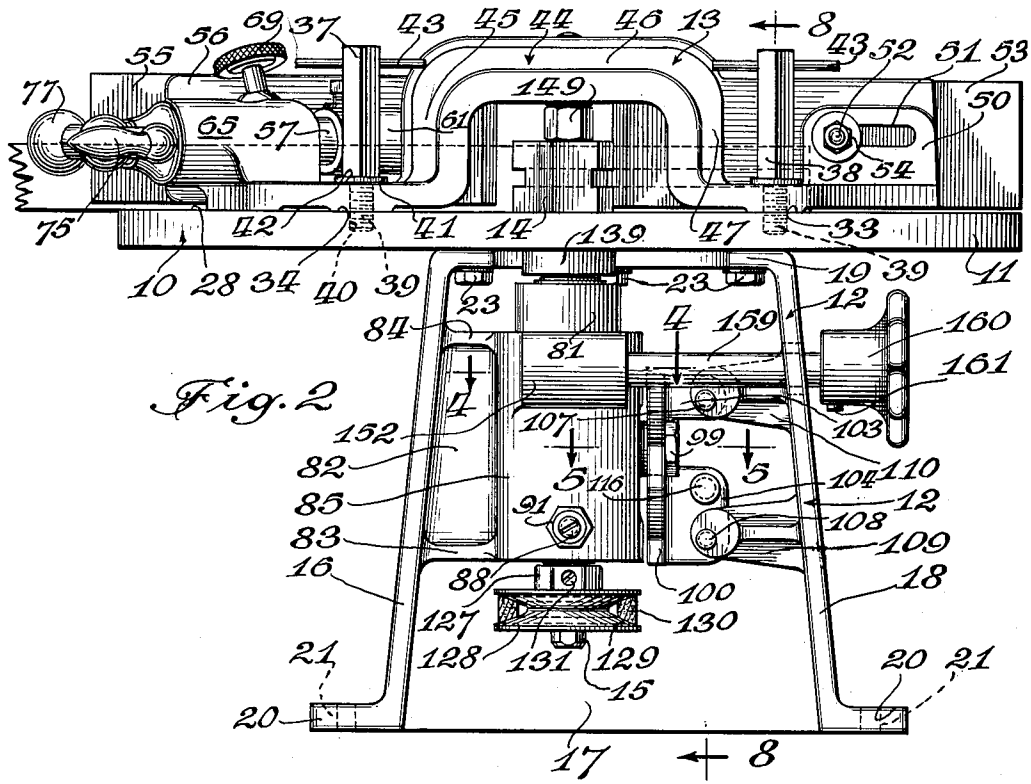


Fig. 2

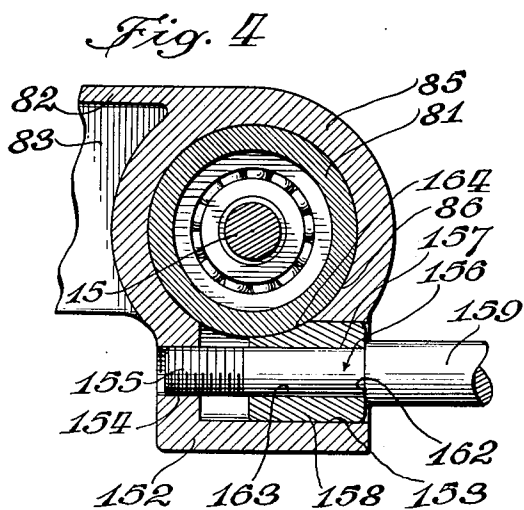


Fig. 4

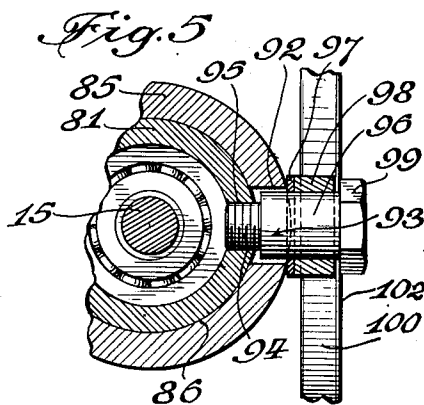


Fig. 5

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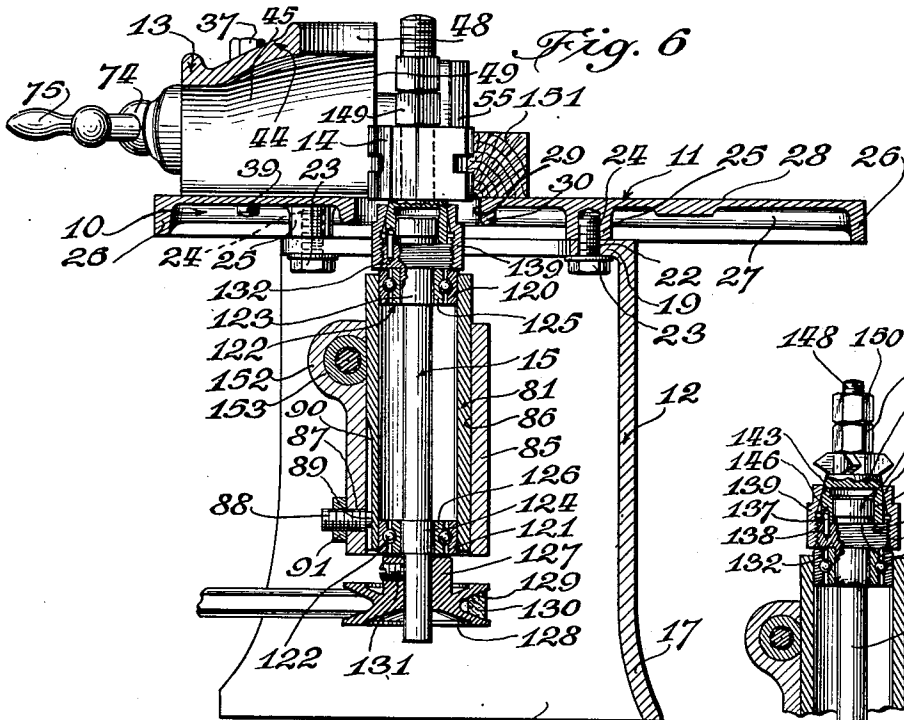
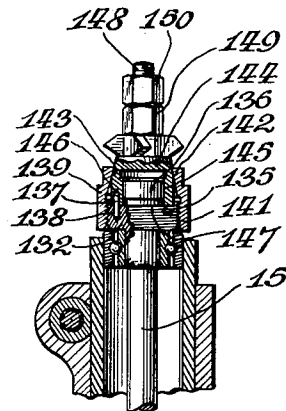
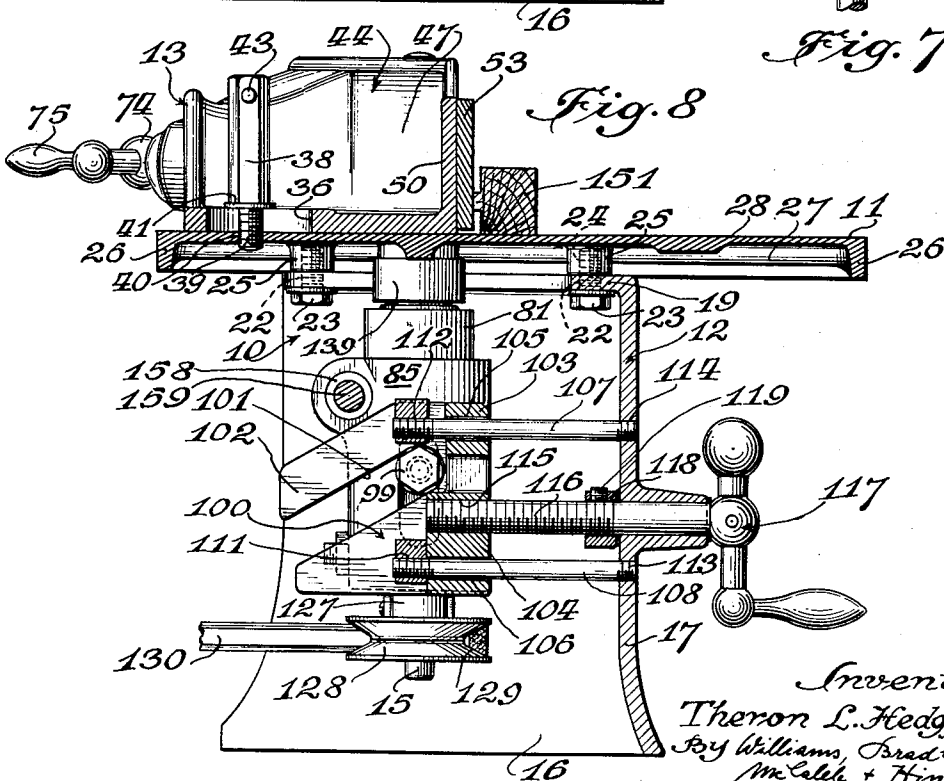
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WOODWORKING TOOL

Filed May 2, 1935

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,076,511

WOODWORKING TOOL

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Application May 2, 1935, Serial No. 19,335

7 Claims. (Cl. 144—134)

The present invention relates to wood working tools, and is particularly concerned with wood working tools of the type usually termed "shapers". Some of the features of the invention, however, are of universal application to other types of tools, and I do not wish to be limited in the application of my invention except as set forth in the appended claims.

One of the objects of the invention is the provision of an improved shaper having an improved form of chuck for securing cutters of various sizes whereby the same shaper may be utilized for performing different kinds of work upon various sizes of material.

Another object of the invention is the provision of an improved shaper structure by means of which cutters or other tools of different sizes and proportions may be very quickly substituted one for the other so as to change the adjustment of the machine for different types of work.

Another object of the invention is the provision of an improved drive shaft arrangement, including means for adjusting the vertical position of the drive shaft and the cutting tool carried thereby which is more simple, economical, sturdy, and capable of more efficiently performing its functions than the devices of the prior art.

Another object of the invention is the provision of an improved construction and mode of adjustment of the guides for maintaining the work in the proper position with respect to the cutting tool.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the three sheets of drawings:

Fig. 1 is a top plan view of a shaper constructed according to the present invention.

Fig. 2 is a rear elevational view of the shaper taken on the plane of the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken through the adjustable support for the movable work guide on the plane of the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary sectional view taken on the plane of the line 4—4 of Fig. 2 showing the details of construction of the clamping means for maintaining the drive shaft bearing at predetermined height.

Fig. 5 is a fragmentary sectional view taken on the plane of the line 5—5 in Fig. 2 looking in the direction of the arrows, showing the details of construction of the adjusting mechanism for

lifting or lowering the supporting bearing for the drive shaft.

Fig. 6 is a vertical sectional view taken on the plane of the line 6—6 of Fig. 1, showing the details of construction of the stand, table, and drive shaft.

Fig. 7 is a fragmentary vertical sectional view taken on the plane of the axis of the shaft spindle showing details of construction of the clutch and associated parts for supporting the cutter.

Fig. 8 is a vertical sectional view taken on the plane of the line 8—8 of Fig. 2 looking in the direction of the arrows, showing further details of construction of the stand, table, and adjusting mechanism for raising or lowering the spindle.

The shaper which is indicated in its entirety by the numeral 10 preferably comprises a table 11, stand 12, guard 13, cutter 14, drive shaft or spindle 15, and other associated parts which will be described in detail, for permitting the shaper to perform its functions most efficiently. The stand or base 12 preferably comprises a cast metal member which may be formed with three vertical walls 16, 17, 18 (Fig. 2) which are joined together in box-like form in substantially right angles to each other, and provided at the top with attaching flanges 19 for securing the table, and at the bottom with attaching flanges or feet 20 for securement to some bench or other supporting member. The flanges 20 are of course provided with openings 21 comprising elongated slots for receiving the bolts which secure the stand 12 to the base. Likewise the attaching flanges 19 at the top are provided with apertures 22 for receiving the screw bolts 23 which are threaded into the threaded bores 24 formed in lugs 25 carried by the lower side of the table top 11.

The table or work supporting member 11 also preferably comprises a cast metal member which is provided with a downwardly extending border flange 26 for the purpose of reinforcing the edge and it may also be provided with a plurality of transverse reinforcing ribs 27 on its lower side, as well as a plurality of lugs 25 previously mentioned, for receiving the attaching screws 23. The upper surface 28 of the table is preferably machined to a flat plane surface across which the work pieces are adapted to slide and by means of which they are guided and maintained in a predetermined vertical plane with respect to the cutter 14. At a predetermined centrally located point the table 11 is formed with a substantially circular aperture 29 bordered by a downwardly

extending flange 30, the aperture 29 being located to pass the spindle 15 and being of sufficient size to accommodate the chuck and other associated structures.

- 5 The table 11 preferably supports the guard structure 13 which may consist of a cast metal member which is formed with a pair of flat attaching flanges 31, 32 each having a considerable area for engaging the table top. The attaching
- 10 flanges 31, 32 may be formed on their lower sides with transversely extending protruding portions or guides 33, 34, preferably located to be formed with the slots 35, 36. The guide portions 33, 34
- 15 on the bottom of the guard may be machined to a flat plane surface, both of the surfaces being in the same plane so that these surfaces are the clamping and engaging surfaces by means of which the guard is secured on the table and against which the clamping bolts 37, 38 act.
- 20 The apertures 35, 36 are preferably in the form of elongated slots so that the guard may be slid upward and downward across the table in Fig. 1, that is, horizontally on the table with respect to the cutter 14. The clamping bolts 37, 38 preferably
- 25 comprise substantially non-circular metal rods which are provided at their lower ends with the reduced threaded portion 39 adapted to be threaded into the threaded bores 40 which are provided in the table top 11.
- 30 A washer 41 may be provided to increase the bearing surface at the shoulder 42 and the clamping bolt may be provided with a transverse pin 43 at the top for engagement with the fingers. The pin 43 may be a drive fit in a transverse
- 35 bore in the bolt 37. In the event of the bolt being too firmly secured to be dislodged by means of pin 43, a wrench or other tool may also be applied to the non-circular metal rods of the bolt 37.
- 40 Between the two attaching flanges 31, 32 of the guard 13, this guard is preferably provided with a raised guard yoke 44 comprising an integral part of the guard which extends upward at 45, horizontally at 46, and downward at 47. The top portion
- 45 46 is preferably provided with a cut-out portion 48 for accommodating the cutter, the proportions being such that the cutter can never be brought into direct engagement with any part of the guard when the guard is secured by its clamping
- 50 bolts 37, 38. The top portion 46 also is cut back at the feed side of the cutter at 49 so as to permit the guide on that side to recede farther in that direction and to permit the desired depth of cut by means of the shaper cutter 14.
- 55 The attaching flange 32 also preferably supports a vertically extending guide flange 50 which is provided with a horizontally extending slot 51 for receiving a screw bolt 52. The guide flange 50 preferably supports a guide in the form of
- 60 a flat wooden strip 53 which is of sufficient width to extend from the table top surface 28 to a point adjacent the top of the guard 44. Wooden guide strip 53 may be secured in place by the screw bolt 52 which extends through the wooden guide
- 65 53 and flange 50, and is provided with a nut 54. The guide strip 53 is adapted to guide that portion of the work which has passed cutter 14 and its position is adjusted by means of the adjustment of the guard 13 on the bolts 37, 38.
- 70 The shaper is also preferably provided with a second additionally adjustable guide strip 55 comprising a similar flat wooden strip which is carried by the supporting flange or shoe 56 adjustably mounted on a shaft 57. The shoe 56 is likewise
- 75 provided with an elongated slot 58 for re-

ceiving the screw bolt 59 which passes through the wooden guide member and through an aperture in the flange 56 to clamp the wooden guard on the guide 56 by means of nut 60.

The supporting shoe or flange 56 also carries 5 a diagonally and rearwardly projecting lug 61 which is provided with a bore or socket 62 for receiving the reduced cylindrical end 63 of the shaft 57. End 63 of shaft 57 may be clamped 10 in its socket 62 by means of a set screw 64 threaded into a transverse bore. The attaching flange 31 of the guard is preferably provided with an upwardly extending bearing portion 65 which extends diagonally with respect to the top of the 15 table for slidably supporting the shaft 57.

Bearing portion 65 is further illustrated in Fig. 3 where it will be observed it is provided with a cylindrical bore 66 for slidably receiving the shaft 57. A transversely extending bore 67 communicates with the bore 66 at the top and is threaded 20 to receive a screw bolt 68 having a knurled head 69. Shaft 57 is provided with a longitudinally extending key-way or slot 70 and screw bolt 68 is provided with a reduced cylindrical portion 71 which is adapted to project into the slot 70, 25 the shaft slidably engaging the end portion 71 and the latter preventing rotation of the shaft 57 as the shaft slides back and forth.

The bearing portion 65 is provided with a 30 smaller counterbore 72 at its outer end for rotatively receiving the adjustment shaft 73. Adjustment shaft 73 is provided at its outer end with a crank comprising a hub 74 and handle 75. The hub 74 has a bore 75' for receiving the end 35 of shaft 73 to which it is secured by a transverse pin 76 which passes through both the hub and shaft and is riveted over at its ends. The crank may also be provided with the counterbalance 77 for balancing the weight of the handle 75. The 40 shaft 73 is preferably formed with an annular flange or thrust bearing 78 located just inside the bore 66, the hub 74 acting as the opposite thrust bearing.

The inner end of shaft 73 is threaded as at 45 79 complementarily to the threads in the threaded bore 80 located in shaft 57. Thus rotation of the shaft 73 by crank 75 results in the progression forward or backward of the shaft 57 which carries the additionally adjustable guide 55. Of 50 course, the guide 55 being carried by shaft 57 which in turn is carried by bearing portion 65 and guard 13, guide 55 is likewise adjustable with the guard 13.

The angle of the supporting flange 56 with 55 respect to shaft 57 is such that the guide strip 55 is carried in a plane parallel to the guide strip 53. Adjustable guide strip 55 may be brought into closer proximity to the cutter 14 by means of the adjustment of the shaft 57 longitudinally 60 in its bearing 65 and at the same time the guide 55 may be moved horizontally in a direction at right angles to the plane of the two guides 53, 55 to determine the depth of cut of the shaper 65 cutter 14.

The stand 12 is also preferably provided with 65 means for supporting an adjustable bearing sleeve 81 by means of which the shaper spindle or drive shaft 15 may be supported for rotation and for adjustment in a vertical plane with respect to the top of the table 11. This supporting 70 means preferably comprises the vertically extending web 82 integrally joined to the horizontally extending webs 83, 84 which are carried by the side wall 16 and which at their edges support the substantially cylindrical bearing sleeve hous- 75

ing 85. The bearing sleeve housing 85 is therefore integral with the stand 12 and it is provided with a vertically extending bore 86 which slidably receives the substantially cylindrical sleeve 81. The housing 85 is preferably provided with a transverse threaded bore 87 for receiving the threaded key bolt 88, the inner end of which is of reduced cylindrical form 89 for being slidably received in the slot 90 which extends vertically of the bearing sleeve 81. Key bolt 88 is secured in fixed adjusted position by means of a lock nut 91 and it prevents the rotation of the sleeve 81 as the sleeve slides upward and downward in the housing 85. The housing 85 is also preferably provided with a vertically extending slot 92 located in the side opposite the supporting webs 82-84 and adapted to pass the stud bolt 93 which has its reduced threaded end 94 threaded home in the threaded bore 95 of bearing sleeve 81. Stud bolt 93 has an enlarged cylindrical portion 96 which may be provided with a washer 97 and which may rotatably support a roller sleeve 98, the roller sleeve being retained thereon by head 99.

The stand 12 is also provided with means for supporting and raising or lowering the bearing sleeve 81 which may comprise the cam member 100 provided with a diagonally and upwardly extending slot 101. The cam member 100 may consist of a cast metal member which is provided with the flat plate portion 102 surrounding the slot 101 and with the horizontally extending lugs 103, 104 which extend at right angles to the flat plate portion 102. Lugs 103, 104 are provided with horizontally extending bores 105, 106 which act as guideways for receiving the guide rods 107, 108. The stand side wall 18 is preferably provided with a pair of inwardly extending cast metal lugs 109, 110 to provide additional support for these guide rods 107, 108 which have their inner threaded ends threaded into the bores 111, 112 in the lugs 109, 110.

The outer ends of the guide rods 107, 108 are threaded into the bores 113, 114 located in the front wall 17 of the stand 12. Thus the guide rods 107, 108 are fixedly mounted and are adapted to slidably support the cam member 100. The lower lug 104 on cam member 100 is preferably provided with a substantially larger body for providing material to form a follower which may be provided by forming a threaded bore 115 in lug 104 parallel to the bore 106. The lug 104 may thus be caused to reciprocate by means of a threaded shaft 116, the inner end of which threads into the bore 115 and the outer end of which carries a crank 117 of similar shape to the crank previously described. Crank 117 is likewise pinned to the shaft 116 as previously described with respect to crank 75 and the shaft 116 may be provided with a thrust bearing 118 in the form of a collar which is secured just inside the front wall 17 by means of a set screw 119 threaded into the collar 118 and bearing against shaft 116. The edges of the slot 101 engage the roller 98 carried by lug 93. As the cam member 100 moves horizontally to the left in Fig. 8, the lower wall of the slot lifts the lug 93 and with it the bearing sleeve 81.

The walls of slot 101 preferably fit the roller 98 quite closely so as to limit end play of the bearing sleeve 81 and spindle 15, and cam 100 may thus be used to definitely adjust the vertical position of the bearing sleeve 81 which carries this spindle 15. The bearing sleeve 81 preferably carries at each end an outer race 120, 121

of the ball bearings 122, which rotatably support the spindle 15. These outer races may be secured in bearing sleeve 81 by frictional or drive fit. The spindle 15 is preferably provided with substantially cylindrical or gradually tapered portions 123, 124 which may be used to secure to the shaft the inner races 125, 126 which may likewise have a frictional or drive fit on the spindle 15.

The lower end of spindle 15 may comprise a cylindrical portion upon which is mounted the hub 127 of a drive pulley 128 preferably of the V type, the groove 129 being adapted to receive the V-shaped belt 130. The pulley 128 may be secured on spindle 15 by means of a set screw 131 passing through the hub and bearing against the shaft. At its upper end the spindle 15 is preferably provided just above the ball bearing 120, 122, 125 with an integral cylindrical enlargement 132 which has its periphery threaded for receiving the adapter sleeve 139 having a complementary internal thread. The upper end of spindle 15 is preferably provided with a flat surface 135 having located in its center a cylindrical axially extending lug 136 for the purpose of centering accurately the cutter and associated parts. Enlargement or head 132 is also preferably provided with an eccentrically located pin 137 extending vertically from its flat top 135 and the pin 137 may be secured by a drive fit in the bore 138.

The upper end of spindle 15 is also provided with a chuck sleeve 139 which may comprise a substantially cylindrical member preferably formed with one or more flat sides (Fig. 1) 140, for receiving a wrench or other tool. The chuck sleeve 139 has a vertically extending bore which is threaded at 141 to engage the threaded head 132. Beyond the threaded bore 141 the chuck sleeve 139 is provided with a frusto conical or tapered aperture 142 which is adapted to engage and center the lower tapered frusto conical body 143 of the tool holder 144.

The tool holder 144 also has a bore 145 for receiving the centering lug 136 and has an eccentrically located bore 146 for receiving the pin 137. The lower end 147 of the tool holder body is substantially flat for engaging the flat upper end of the chuck head 132 and the relative proportions of the frusto conical body 143 and frusto conical bore 142 are such that the flat end 147 of the tool holder body may be drawn tightly against the flat end of the chuck head 132 by the sleeve 139. The tool holder is of course centered by the lug 136 in bore 146 and secured against rotation by the pin 137 in bore 146.

Tool holder 144 also comprises an upwardly extending threaded shaft 148 on which the shaper cutter may be secured. The shaper cutters have cylindrical bores for receiving the shaft 148 and the shaft is provided with a securing nut 149 and a lock nut 150 for fixedly securing the cutter on the shaft. Cutters of various sizes and types may be employed, the cutter shown in Fig. 7 making a V-shaped groove while the cutter shown in Fig. 6 is adapted to form a board with the ordinary tongue used on tongue and groove lumber.

The amount which is cut from the work piece 151 depends upon the setting of the guide member 55 with respect to the cutter, and after the work piece passes the cutter it is further guided in its course by means of the guide member 53. The cutter may be raised or lowered with the spindle 15 to work upon the material at any elevation and thus the groove formed for example in

Fig. 6 may be formed at any desired elevation with respect to the upper and lower surfaces of the work piece 151.

The bearing sleeve housing 85 is also preferably provided with means for fixedly clamping the bearing sleeve in any predetermined position, the details of which are shown in Fig. 4. Thus the bearing sleeve housing 85 may be provided with a laterally projecting clamp housing 152 which comprises a substantially cylindrical lug, the axis of which extends horizontally and which is provided with a horizontal circular bore 153 communicating with the vertical bore 86. A threaded bore 154 is formed in the rear wall of the clamp housing 152 and adapted to receive the threaded end 155 of a clamping bolt 156. The clamping bolt 156 is formed with a reduced cylindrical portion 157 which rotatably receives a clamp sleeve 158.

Clamp shaft 156 is also provided with an enlarged cylindrical extension 159 which is of sufficient length to extend out beyond the wall 18 where it supports a hand knob 160 which is secured thereto by means of a set screw 161. Between the cylindrical extension 159 and the reduced portion 156 there is an annular shoulder 162 which bears against the clamp sleeve 158. Clamp sleeve 158 is a cylindrical member provided with a bore 163 for receiving the cylindrical part 156 and its outer surface is substantially cylindrical except for the portion 164 at the inner end which is curved complementarily to the bearing sleeve 81 or tapered. When the clamp sleeve 158 is urged inward by means of shaft 156 the surface 164 engages the bearing sleeve 81 and forces the bearing sleeve into engagement with the opposite side of the bore 86 thus clamping the bearing sleeve 81 in any predetermined vertical position.

It will thus be observed that I have invented an improved shaper structure by means of which various cutters may be applied to the cutter spindle without the necessity for removing the spindle or reversing the spindle as is necessary in many of the devices of the prior art. The spindle chuck is adapted to receive and secure the tool holders for various sizes of tools and the cutter may be changed very quickly by merely removing the cutter with its tool holder by means of a wrench applied to the chuck sleeve 139. If the cutter is of such size that it will go on the same tool holder it is only necessary to remove the two nuts 149, 150 which secure the cutter in place.

My shaper is also provided with the improved form of guard and guide arrangement by means of which both guides may be simultaneously adjusted and clamped in position with the screw bolts 37 and additional adjustment may be secured for the guide member 55 which determines the depth of cut by means of the threaded member 79 actuated by crank 75 adjusting the shaft 57. The threaded member itself is adapted to hold this guide in predetermined position without necessity for any additional clamp, but if desired the screw bolt 68 may perform the additional function of more securely clamping this shaft 57 and guide 55 in place.

While I have illustrated and described a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details set forth but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I

claim as new and desire to secure by Letters Patent of the United States is:

1. In a shaper, the combination of a supporting base with a work supporting table, said base having a spindle housing located inside the base and extending vertically, said spindle housing having a vertically extending bore, a bearing sleeve slidably mounted in said vertically extending bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said cam means having a diagonally and upwardly extending slot for engaging said lug, said cam means being slidably mounted on a pair of guide rods, and a threaded member for reciprocating said cam means in a horizontal direction on said guide rods to adjust said spindle.

2. In a shaper, the combination of a supporting base with a work supporting table, said base having a spindle housing located inside the base and extending vertically, said spindle housing having a vertically extending bore, a bearing sleeve slidably mounted in said vertically extending bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said cam means having a diagonally and upwardly extending slot for engaging said lug, said cam means being slidably mounted on a pair of guide rods, and a threaded member for reciprocating said cam means in a horizontal direction on said guide rods to adjust said spindle, said spindle housing having a laterally projecting extension for receiving a clamping sleeve, said clamping sleeve engaging said bearing sleeve, and threaded means extending from said housing and engaging said clamping sleeve to force said clamping sleeve into engagement with said bearing sleeve to secure said spindle in any predetermined elevation.

3. In a shaper, the combination of a support comprising a base, with a table fixedly secured to said base, a pair of cylindrical guides carried by said base and extending horizontally, a slider carried by said guides and having a threaded bore, a threaded shaft engaging said threaded bore and having engagement with a bearing in said base, a crank on said shaft for rotating said shaft and reciprocating said slider, said slider having a diagonally upwardly extending slot, a vertically extending slot carried by said base, a bearing sleeve slidably mounted in said vertical sleeve, and means for preventing rotation of said bearing sleeve, a shaft rotatably mounted in said bearing sleeve by anti-friction bearings at each end of said bearing sleeve, means carried by said bearing sleeve engaging in said diagonal slot, and a cutter carried by said shaft adjacent said table, said table having an aperture for passing said cutter and shaft whereby the crank may be rotated to determine the elevation of said cutter with respect to said table.

4. In a wood working tool the combination of a supporting base with a work supporting table, said base supporting a vertically extending spindle housing and said spindle housing having a vertically extending bore, a bearing sleeve mounted in said bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said cam means

comprising a metal member having a diagonally and upwardly extending slot for engaging said lug, guide means for slidably mounting said cam means for movement in a plane transverse to the axis of the spindle, and a threaded member for reciprocating said cam means in said transverse plane on said guide means to adjust the elevation of said spindle with respect to said table.

5. In a wood working tool the combination of a supporting base with a work supporting table, said base supporting a vertically extending spindle housing and said spindle housing having a vertically extending bore, a bearing sleeve mounted in said bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said cam means comprising a metal member having a diagonally and upwardly extending slot for engaging said lug, guide means for slidably mounting said cam means for movement in a plane transverse to the axis of the spindle, and a threaded member for reciprocating said cam means in said transverse plane on said guide means to adjust the elevation of said spindle with respect to said table, said spindle housing having a lateral extension for receiving a clamping member and means for urging said clamping member into engagement with said bearing sleeve to secure said cutter at a predetermined elevation.

6. In a wood working tool the combination of a supporting base with a work supporting table, said base supporting a vertically extending spindle housing and said spindle housing having a vertically extending bore, a bearing sleeve mounted in said bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said

cam means comprising a metal member having a diagonally and upwardly extending slot for engaging said lug, guide means for slidably mounting said cam means for movement in a plane transverse to the axis of the spindle, and a threaded member for reciprocating said cam means in said transverse plane on said guide means to adjust the elevation of said spindle with respect to said table, said spindle housing having a lateral extension for receiving a clamping member and means for urging said clamping member into engagement with said bearing sleeve to secure said cutter at a predetermined elevation, said latter means comprising a threaded member having a shoulder engaging said clamping member and having threaded engagement with said housing.

7. In a wood working tool the combination of a supporting base with a work supporting table, said base supporting a vertically extending spindle housing and said spindle housing having a vertically extending bore, a bearing sleeve mounted in said bore and having a transversely extending lug, a spindle rotatably mounted in said bearing sleeve and carrying a cutter, cam means for adjusting the vertical position of said spindle by reciprocating said bearing sleeve, said cam means comprising a metal member having a diagonally and upwardly extending slot for engaging said lug, guide means for slidably mounting said cam means for movement in a plane transverse to the axis of the spindle, and a threaded member for reciprocating said cam means in said transverse plane on said guide means to adjust the elevation of said spindle with respect to said table, said guide means comprising a pair of rods having threaded ends, one end of each rod being mounted on said base and the other end of each rod being secured to said spindle housing, said cam having bores slidably engaging said rods.

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