(No Model.) 3 Sheets—Sheet 1.

A. WOOD.

MACHINE FOR TURNING PULLEYS.

No. 521,353. Patented June 12, 1894.

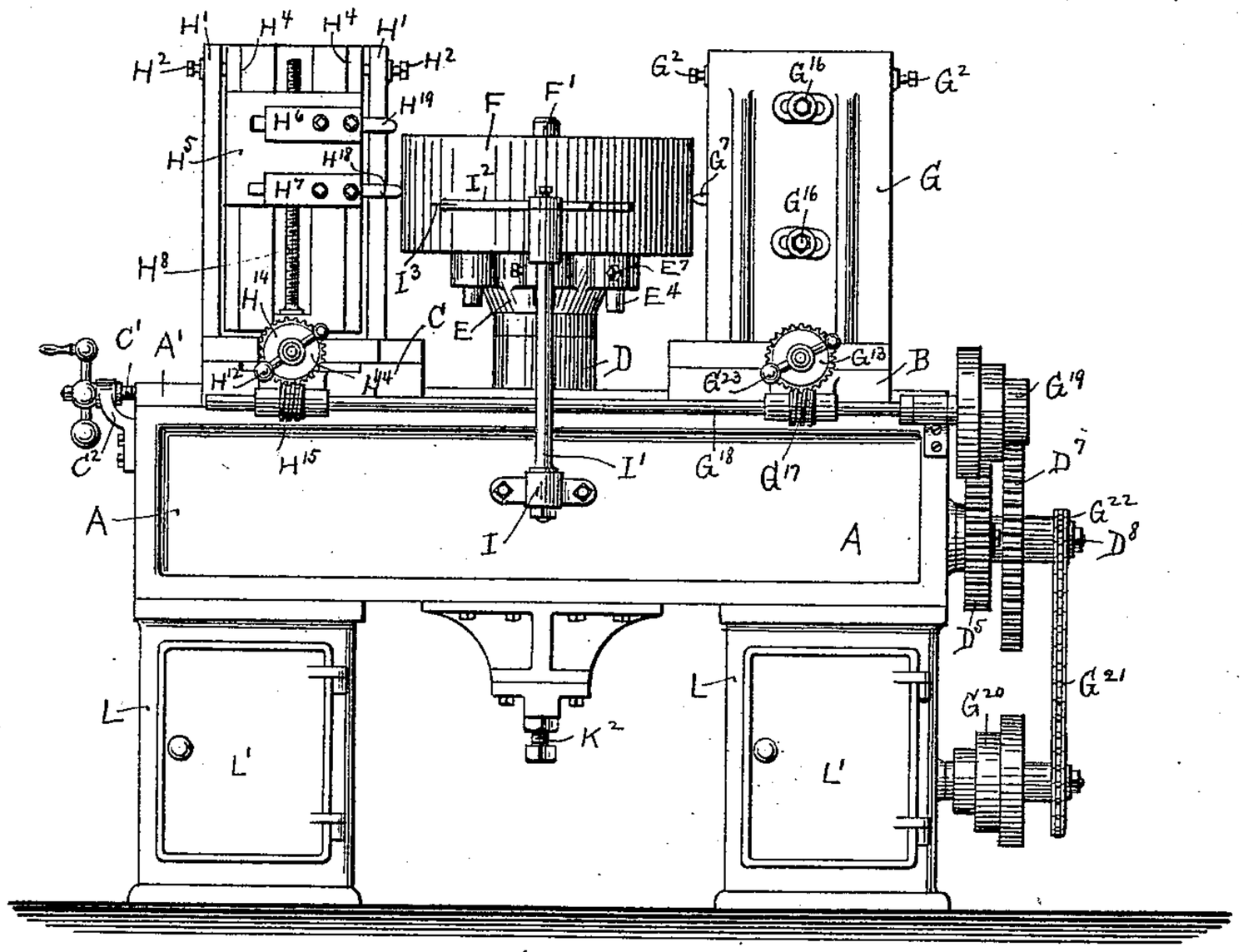

Fig. 1.

Fig. 2.

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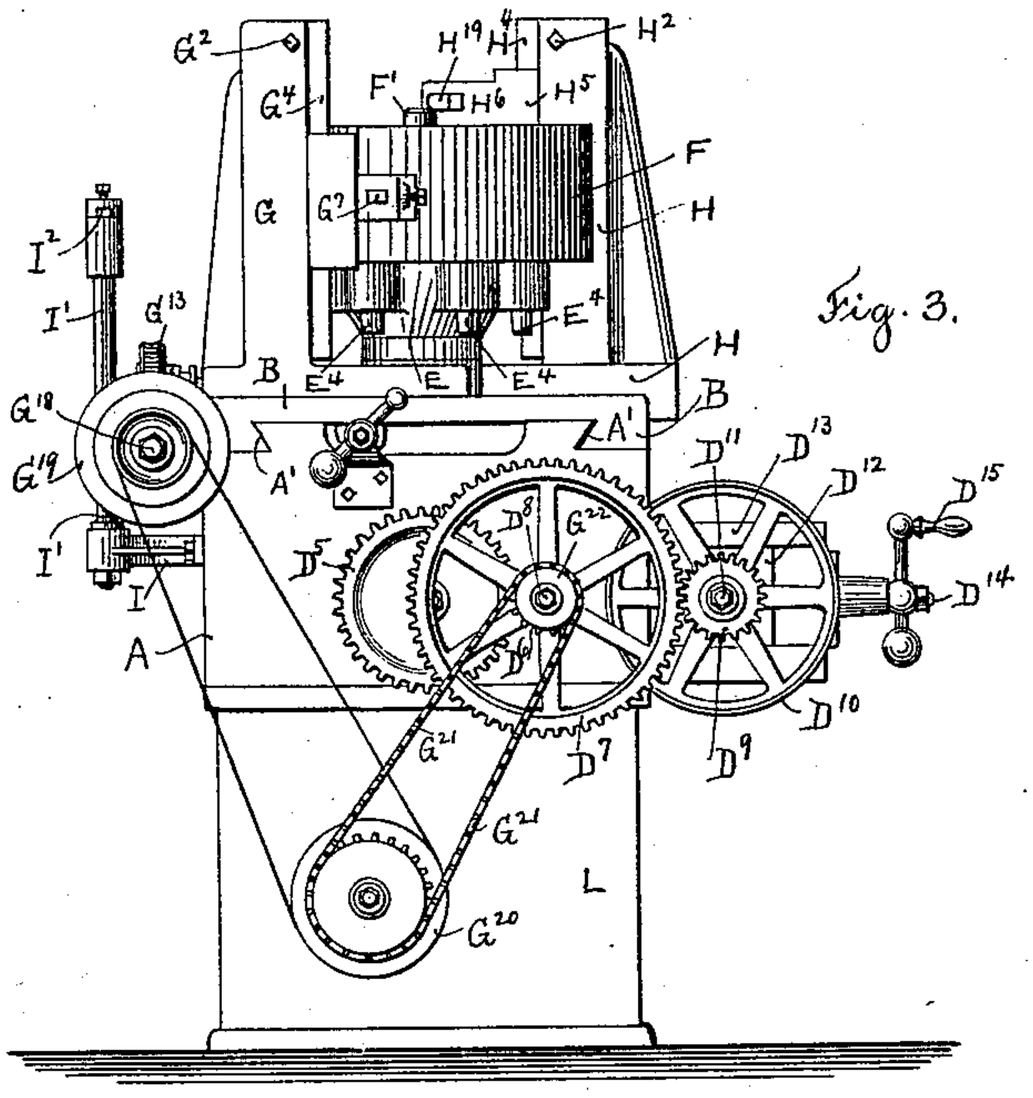

Fig. 3.

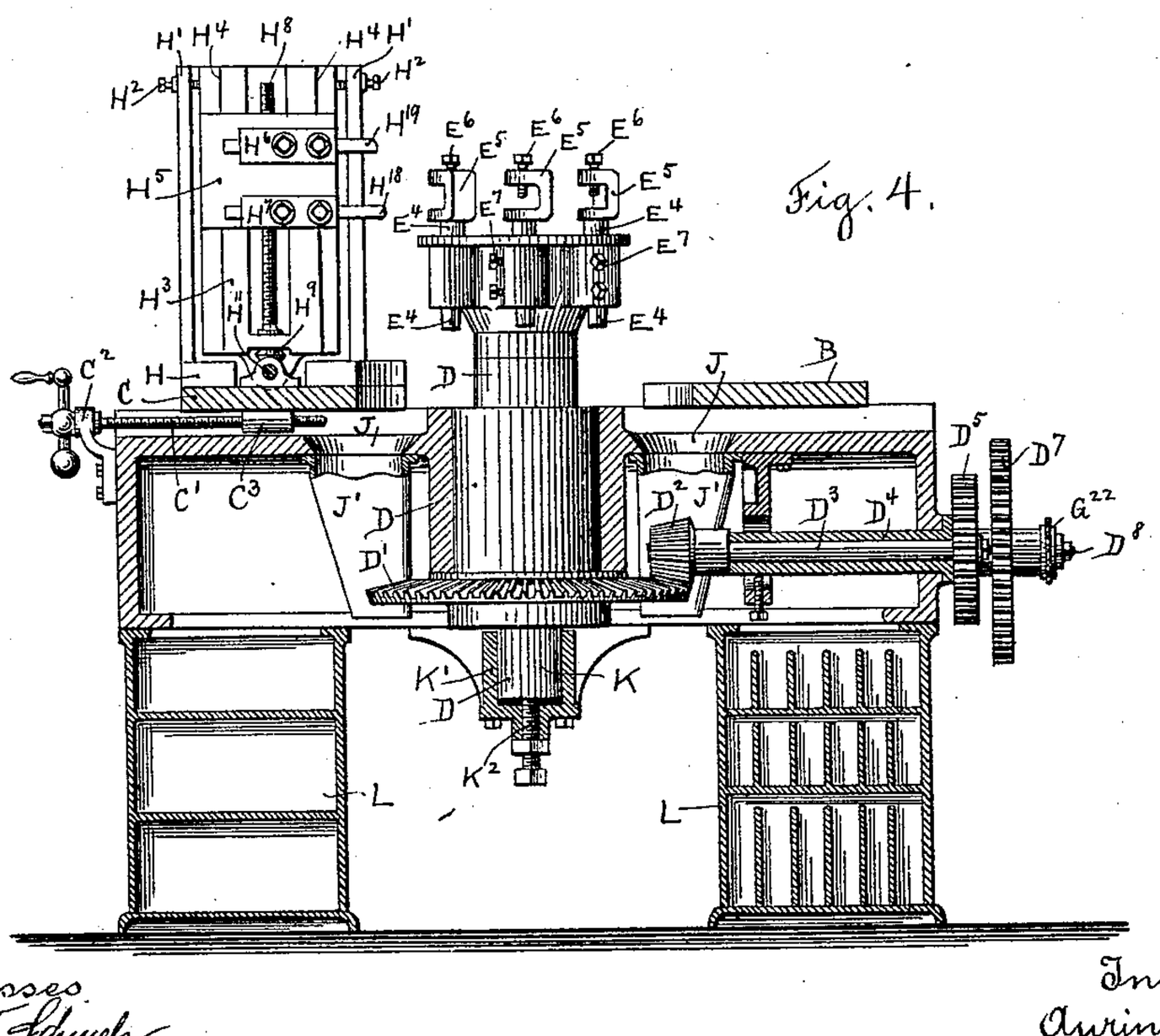

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

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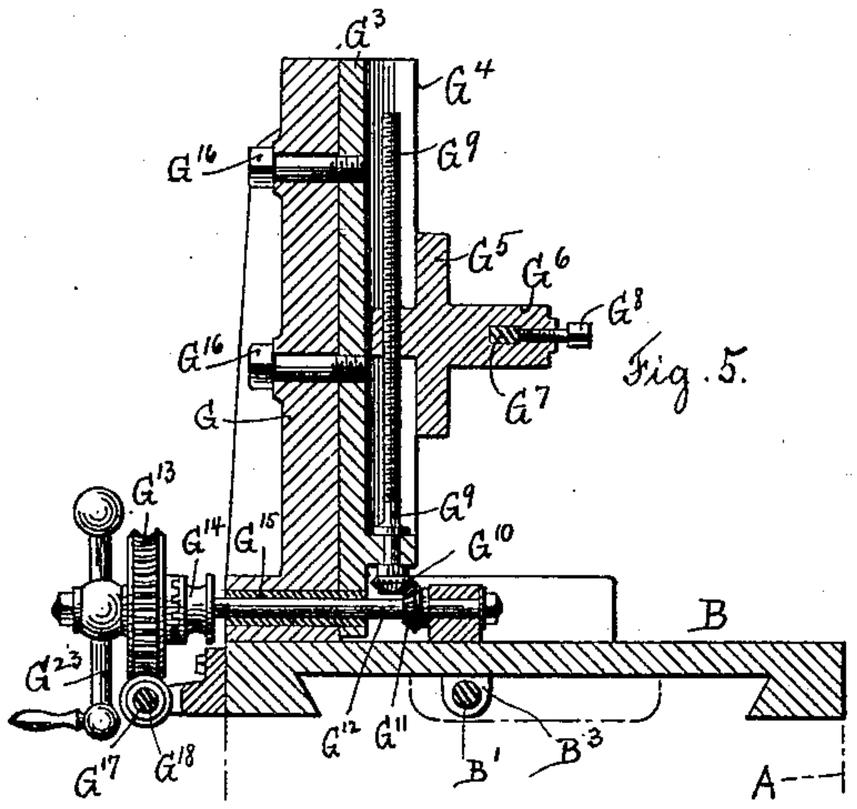

Fig. 5.

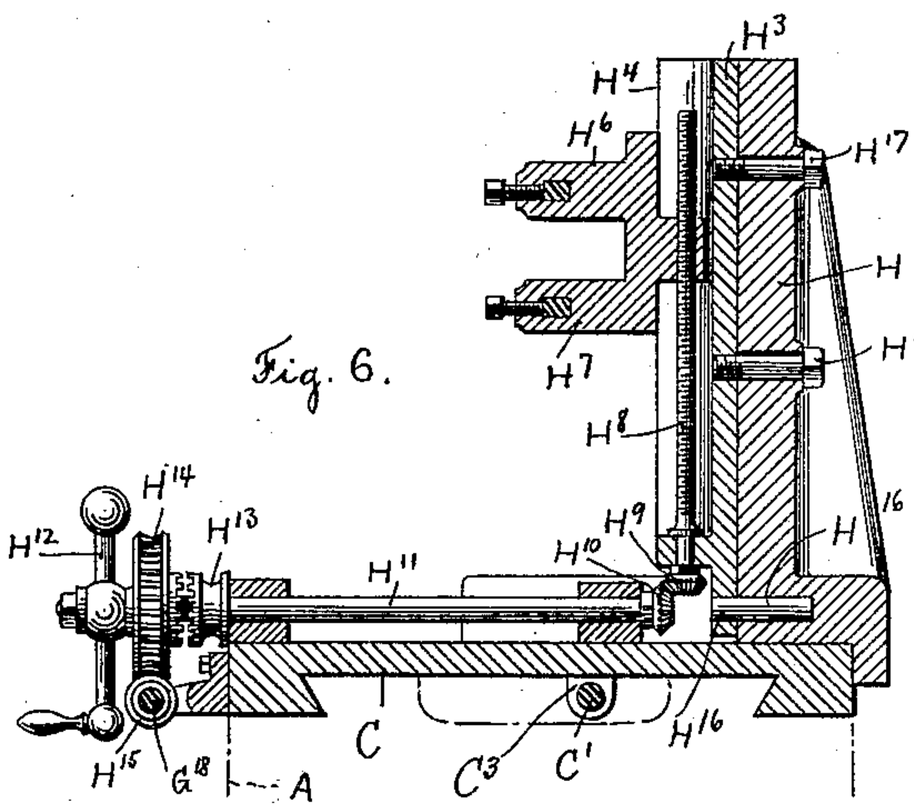

Fig. 6.

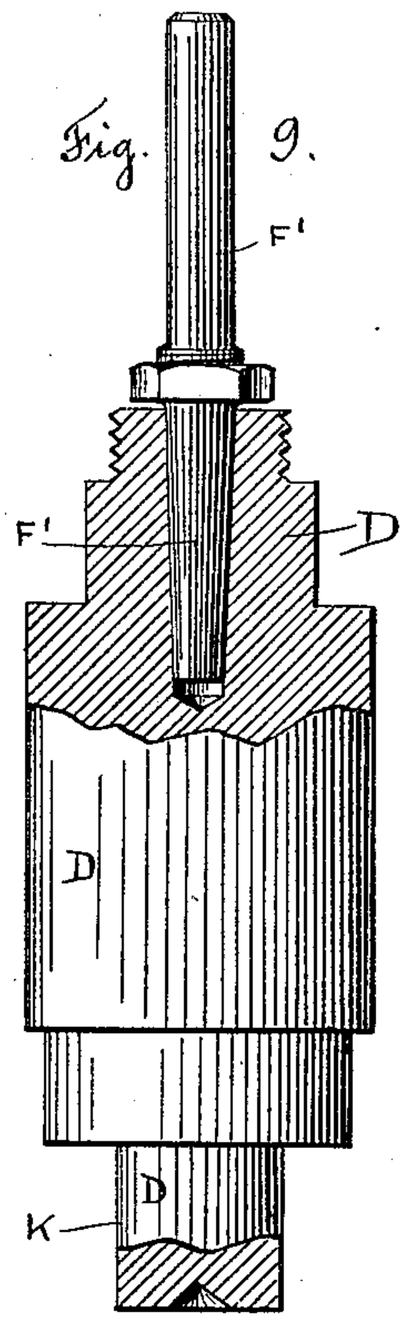

Fig. 9.

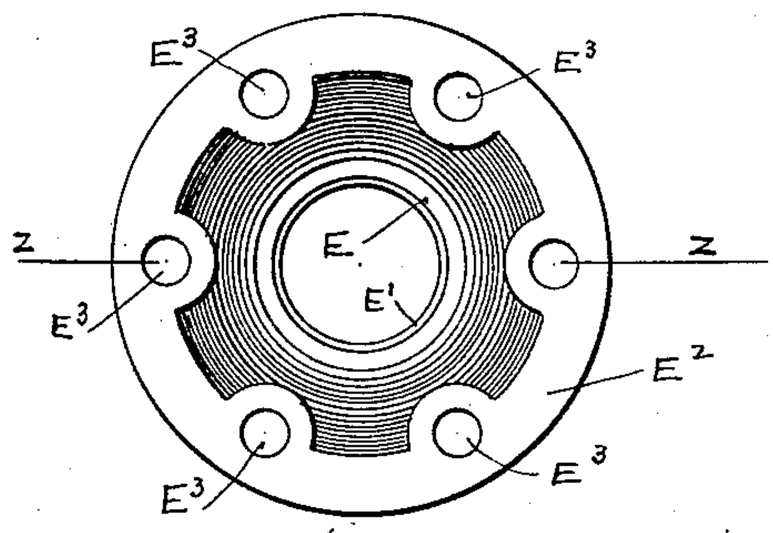

Fig. 7.

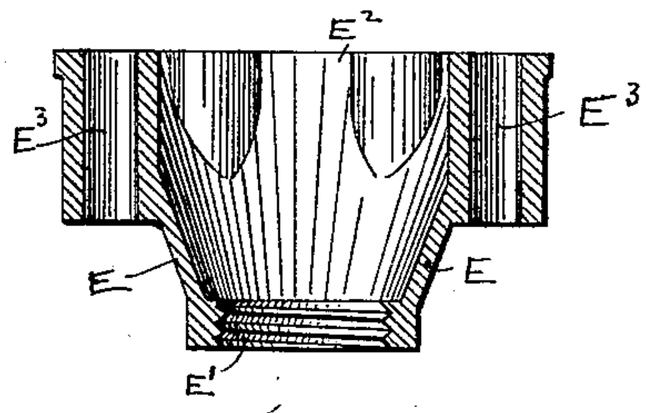

Fig. 8.

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UNITED STATES PATENT OFFICE.

AURIN WOOD, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE L. W. POND MACHINE COMPANY, OF SAME PLACE.

MACHINE FOR TURNING PULLEYS.

SPECIFICATION forming part of Letters Patent No. 521,353, dated June 12, 1894.

Application filed October 31, 1891. Serial No. 410,442. (No model.)

To all whom it may concern:

Be it known that I, AURIN WOOD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Machines for Turning Pulleys, of which the following is a specification, reference being made to the accompanying drawings, forming a part of the same, and representing a machine for boring pulleys, embodying my invention.

Figure 1 represents a front view of the machine. Fig. 2 is a top view. Fig. 3 is an end view. Fig. 4 is a central longitudinal sectional view of the machine. Fig. 5 is a sectional view of one of the tool supporting and feeding mechanisms shown on line X, X, Fig. 2. Fig. 6 is a corresponding sectional view of the opposite tool supporting and feeding mechanism, shown on line Y, Y, Fig. 2. Fig. 7 is a top view of the pulley support and Fig. 8 is a sectional view of the same on line Z, Z, Fig. 7. Fig. 9 is a detached view of the pulley supporting spindle with a concentric arbor held therein, a portion of said spindle being shown in sectional view.

Similar letters refer to similar parts in the several figures.

Referring to the accompanying drawings A denotes the bed of the machine provided with ways A′ upon its upper surface upon which the carriages B, C, are moved lengthwise the bed by means of the actuating screws B′ and C′ journaled in brackets B^2 and C^2 and engaging nuts upon the under side of the carriages, one of which is shown at C^3 Fig. 4.

Journaled in the center of the bed is a vertical spindle D carrying a bevel gear D′ engaged by a bevel pinion D^2 upon a shaft D^3 journaled within the sleeve D^4, forming part of the frame-work of the machine and carrying the gear wheel D^5 engaged by a pinion D^6 attached to the gear D^7 turning loosely upon a stud D^8 held in the frame-work of the machine; the gear D^7 is engaged by the pinion D^9 attached to the driving belt pulley D^{10} and both turning loosely upon a stud D^{11} held in a sliding block D^{12} sliding in ways upon the bracket D^{13} and engaged by a screw D^{14} having a crank handle D^{15} by which the block D^{12} is moved along the ways in the bracket D^{13} so as to vary the distance between the studs D^{11} and D^6 and allow the pinion D^9 to be exchanged for pinions of different sizes by which the speed of the central spindle D is varied relatively to the speed of the belt pulley D^{10}. The spindle D carries upon its upper end a pulley support E in the form of an inverted hollow cone provided with an internal screw thread E′ by which it is screwed upon the upper end of the spindle D. The cone E is provided with a series of equi-distant concentric holes E^3, which receive the shanks E^4 of the U-shaped spoke clamps E^5 in the upper arm of which are placed the binding screws E^6; the spoke clamps E^5 can be raised or lowered in the holes E^3 and held in position by set screws E^7.

Figs. 1, 2 and 3 represent a pulley F in position to be turned and Fig. 4 represents the pulley holding mechanism the pulley having been removed. The pulley to be turned is first bored concentrically with its outer face and placed upon the center arbor F′ held concentrically in the spindle D and fitting the hole bored in the pulley by which the pulley F is held concentric with the rotating spindle D. The spokes F^2 of the pulley are brought between the arms of the clamps E^5 and held by the clamping screws E^6, causing the rotation of the spindle D to be imparted to the pulley F in the direction of the arrow 1 Fig. 2. The spindle D is provided with center arbors of different sizes to fit different sized holes in the pulleys and the speed with which the rim of the pulley F, travels is kept approximately the same whatever the diameter of the pulley, by means of a series of change gears carried upon the hub of the driving pulley D^{10} and interchangeable with the pinion D^9 by varying the distance between the studs D^6 and D^{11}. Cones E of different sizes are provided to receive pulleys of great difference in diameter in order to allow the spokes of the pulley to be engaged by the clamps E^5 near the rim of the pulley in order to reduce the vibration of the rim in the process of being turned.

The carriage B supports a vertical post G provided with the flanges G′, G′ in which are

placed the adjusting screws G^2, G^2 and between which is placed a plate G^3 provided with ways G^4 along which slides a saddle-plate G^5 carrying a tool holder G^6 in which a cutting tool G^7 is held by set-screws G^8. A screw G^9 journaled in the plate G^3 serves to adjust the saddle-plate vertically along the ways G^4. The lower end of the screw G^9 carries a bevel pinion G^{10} engaging a bevel-pinion G^{11} upon a spindle G^{12} upon which a worm-gear G^{13} turns loosely and is capable of being connected with the spindle G^{12} by a clutching mechanism G^{14} having a spline connection with the spindle G^{12}, allowing the motion of the worm-gear G^{13} to be communicated to the spindle G^{12} at will. The plate G^3 is provided with a hollow sleeve G^{15} journaled in the upright post G concentrically with the spindle G^{12} by which the plate G^3 is capable of a slight rocking motion about the axis of the spindle G^{12} as adjusted by the screws G^2. By this means the plate G^3 and ways G^4 can be fixed in a vertical position parallel with the axis of the spindle D, in which position the cutting tool G^7 will be fed across the face of the pulley F turning the same straight and parallel with the axis of the spindle D. By tipping the plate G^3 out of a vertical position the point of the cutting tool will be fed in a line obliquely to the axis of the spindle D. When the desired inclination of the plate G^3 and ways G^4 is secured the plate G^3 is clamped against the upright post G by the screws G^{16}, G^{16}. The worm-gear G^{13} is driven by a worm G^{17} carried by a horizontal shaft G^{18} which is rotated through the cone pulley G^{19} having a belt connection with the cone pulleys G^{20} driven by a chain belt G^{21} from a sprocket G^{22} upon the hub of the gear D^7. The spindle G^{12} is also provided with a crank G^{23} allowing the cutting tool G^7 to be fed by hand.

Upon the carriage C is an upright post H provided with the flanges H′ carrying adjusting screws H^2 between which is placed a plate H^3 provided with vertical ways H^4 along which slides the saddle-plate H^5 carrying the upper and lower tool holders H^6 and H^7. The saddle-plate H^5 is fed along the ways H^4 by a screw H^8 having a bevel gear H^9 engaging a gear H^{10} upon a spindle H^{11} having a crank H^{12} and a sliding clutch H^{13} having a spline connection with the spindle H^{11} and engaging a worm-gear H^{14} turning on the spindle H^{11} and driven by a worm H^{15} on the horizontal shaft G^{18}. The plate H^3 carries a stud H^{16} journaled in the upright post H with its axis in alignment with the axis of the spindle H^{11}; the construction of the tool holding and feeding mechanisms upon the carriage C being substantially the same in their essential features to the similar mechanisms supported upon the carriage B; the plate H^3 being adjusted relatively to the axis of the spindle and clamped in position against the upright post H by the tightening screws H^{17}, H^{17}.

Supported in the bracket I, attached to the bed of the machine is a post I′ carrying the graduated bar I^2 capable of rotating about the axis of the post I′ and also of sliding diametrically to the post. One end of the graduated bar I^2 carries a roll I^3.

The bed of the machine is provided with openings J, J communicating with tubes J′ extending downward to the bottom portion of the bed. The openings J, J are situated beneath the points of the cutting tools in position to receive the chips which are conducted through the tubes J′ to the floor or a receptacle beneath the bed of the machine. The lower end of the vertical spindle D is reduced in diameter at K and journaled in the bearing K′ which holds a screw K^2 upon which the end of the spindle D rests and which is capable of vertical adjustment in order to support the weight of the spindle D. The supporting legs L, L are hollow and closed upon one side by doors L′ to provide suitable receptacles for the change-gears to be used upon the hub of the belt pulley D^{10} and also for the various sizes of center arbors used in the spindle D.

The operation of the machine is as follows: The pulley to be turned is placed in the position of pulley F, as already described, the plates G^3 and H^3 are placed in proper position to give the requisite taper to the face of the pulley and the tools G^7 and H^{18} are brought in contact with the center of the face of the pulley as represented in Fig. 1, and the carriages B and C carried toward the spindle D until the center of the face of the pulley is turned the desired size, which is determined by carrying the roll I^3 against the turned portion of the pulley and reading the diameter indicated by the scale upon the graduated bar I^2. The spindles G^{12} and H^{11} are then connected with their respective worm-gears, causing the tool G^7 to be fed upward from the center of the pulley toward the edge and the tool H^{18} to be fed downward from the center of the pulley toward the edge, causing the face of the pulley to be turned from the center upward and downward simultaneously and with the corresponding taper. The saddle-plate H^5 is provided with two tool holders H^6 and H^7, the former placed at or near the upper edge of the saddle-plate H^5 and the latter placed at or near the lower edge of the saddle-plate; the object of these tool holders is to furnish supports for cutting tools by which the edges of the rim of the pulley can be finished. After the face of the pulley has been turned in the manner already described by the cutting tools G^7 and H^{18}, tool H^{18} is withdrawn and a properly shaped cutting tool H^{19} is placed in the holder H^6 and carried against the upper edge of the pulley rim; tool H^{19} is then withdrawn and a corresponding tool placed in the holder H^7 and brought against the lower edge of the pulley rim.

I am aware that boring mills have been constructed having a bed-plate supporting a

rotating spindle upon which the box is carried; side housings and a transverse rail supported by the side housings and having one, or more, saddles carrying cutting tools, capable of an adjustment at an angle to the axis of the work supporting spindle and provided with feeding mechanism by which the tools are fed across the vertical surface of the work and I do not herein claim such. I do away with the vertical side housings, and with the transverse rail above the work, thereby allowing the pulley to be turned, to be lifted vertically upon and off from the machine by an over head crane or other means, the transverse adjustment of the cutting tools, to accommodate pulleys of different diameters, being accomplished by means of ways formed in the bed of the machine; I also carry the tools in saddles or tool holders, which have a vertical feeding motion along ways formed in plates projecting from carriages moving along the transverse way formed in the bed of the machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pulley turning machine, the combination of a bed, a spindle journaled vertically in said bed, a pulley support carried by said spindle, a horizontal way below said pulley support, a carriage capable of sliding on said way, a post extending vertically from said carriage when said post is parallel with the axis of said pulley support, a way upon one of its vertical sides of said post, and a tool holder capable of sliding on said way in a plane parallel with the axis of said pulley support, substantially as described.

2. In a pulley machine, the combination of a bed provided with ways extending across the top of said bed, a spindle journaled in said bed and having a pulley support upon its upper end, a carriage arranged to slide along said ways, a plate pivotally attached to and extending upward from said carriage and provided with ways for a tool holder, a tool holder sliding along the ways upon said pivoted plate, and means by which said pivoted plate can be held at a desired angle to the axis of said spindle, substantially as described.

3. In a pulley machine, the combination of a bed, provided with ways extending across the top of said bed, a carriage arranged to slide on said ways, a rotating pulley support journaled in said bed, a rotating shaft journaled in said carriage, a plate pivoted upon said carriage concentrically with said shaft, a tool holder sliding along said pivoted plate, a feed screw journaled on said plate, and engaging said tool holder, said feed screw being operatively connected with said shaft, and means by which said pivoted plate is adjustably held in relation to said rotating pulley support, substantially as described.

4. In a pulley turning machine, the combination with a bed and a spindle journaled in said bed and carrying a pulley support, of a way on said bed, carriages moving along said way, rotating feed shafts journaled in said carriages, a driving shaft G^{18} connected with said feed shafts, by which they are simultaneously driven, plates supported on said carriages and pivoted concentrically with said feed shafts, actuating screws journaled on said plates and operatively connected with said feed shafts, and tool holders capable of sliding on said plates in planes parallel with the axis of said pulley support, substantially as described.

5. In a pulley turning machine, the combination of a bed, a spindle journaled in said bed, tool holders moving along ways by which they are traversed across the face of the pulley to be turned, a rotating feed shaft G^{18}, feed screws actuating said tool holders and clutching mechanisms by which said feed screws are operatively connected with said feed shaft, substantially as described.

6. In a pulley turning machine, the combination of a rotating spindle, by which the pulley to be turned is carried, an arbor held concentrically in said spindle, and a series of pulley clamping devices carried by said spindle and arranged around said arbor and consisting of the U-shaped clamps E^5 carrying the tightening screws E^6, substantially as described.

7. In a pulley turning machine, the combination of a rotating spindle, by which the pulley is carried, a tool holder arranged to traverse across the face of the pulley to be turned, a fixed spindle supported by the face of the machine, a sliding graduated gage bar supported by said fixed spindle, whereby the diameter of the pulley is determined, substantially as described.

8. In a pulley turning machine, the combination of a bed, a spindle journaled in said bed and carrying the pulley to be turned, a driving pulley, intermediate connecting mechanism between said spindle and said driving pulley, a sliding block carrying said driving pulley, by which its position is varied to allow change-gears to be used, and an actuating screw, by which said block is moved, substantially as described.

Dated at Worcester, in the county of Worcester and State of Massachusetts, this 22d day of October, 1891.

AURIN WOOD.

Witnesses:
RUFUS B. FOWLER,
W. F. BANCROFT.