(No Model.) 2 Sheets—Sheet 1.

# L. L. HILL.

## WOOD TURNING LATHE.

No. 377,617. Patented Feb. 7, 1888.

Fig. 1

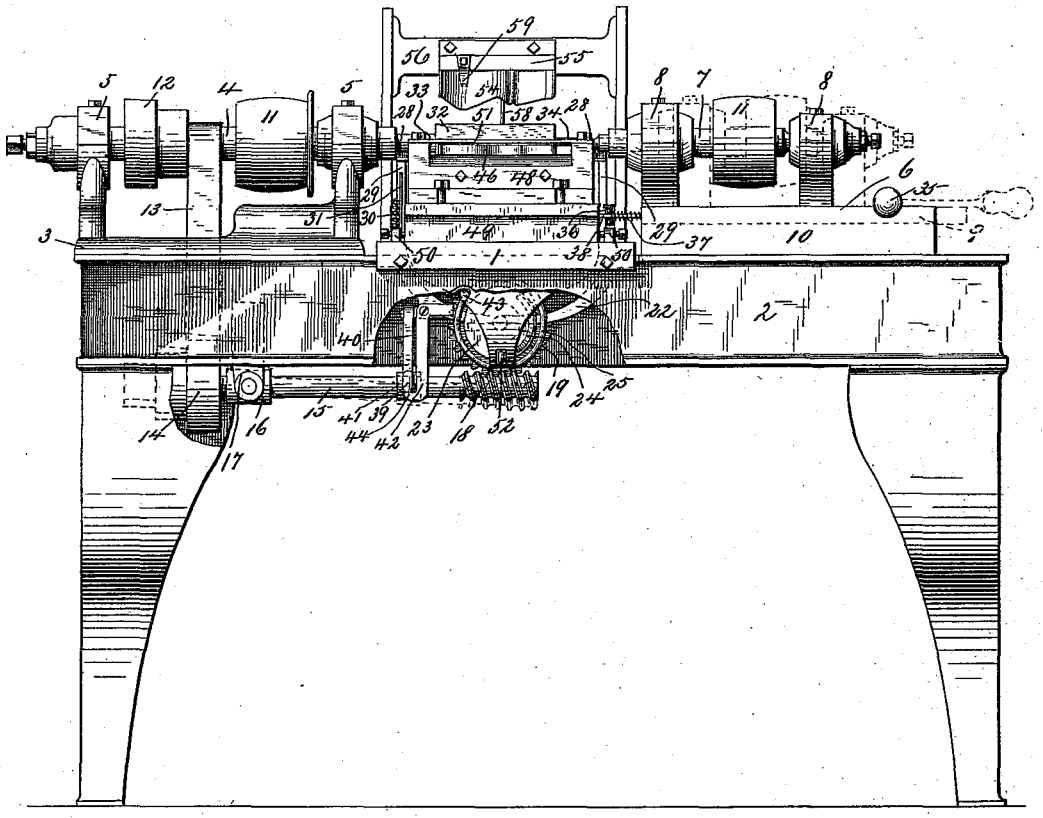
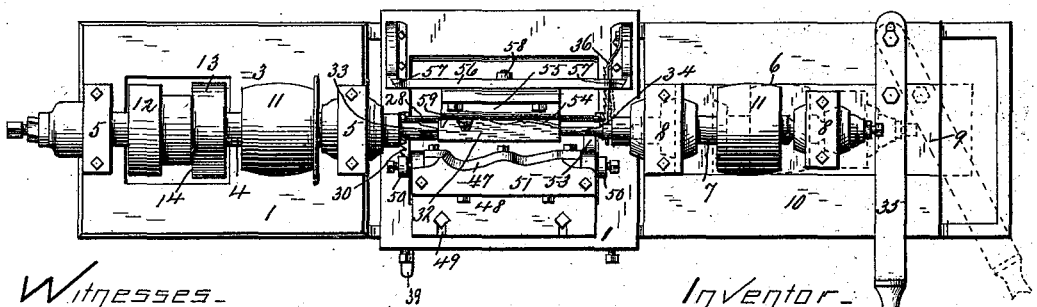


Fig. 2.



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

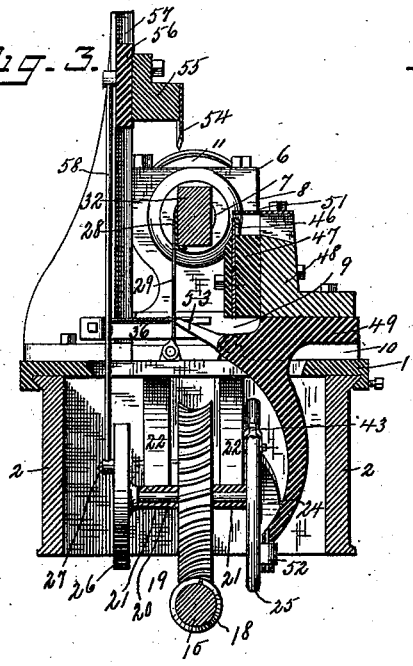

Fig. 4

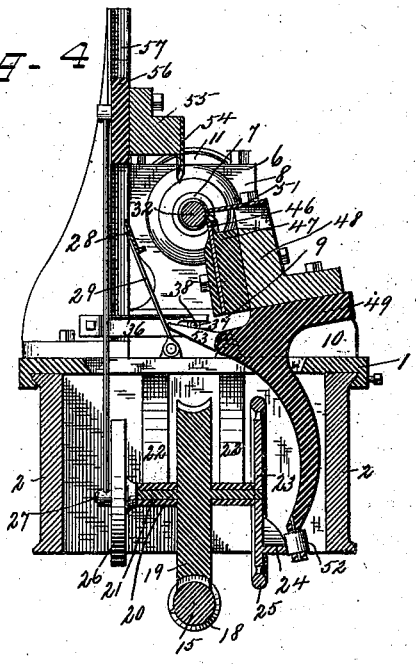

Fig. 5.

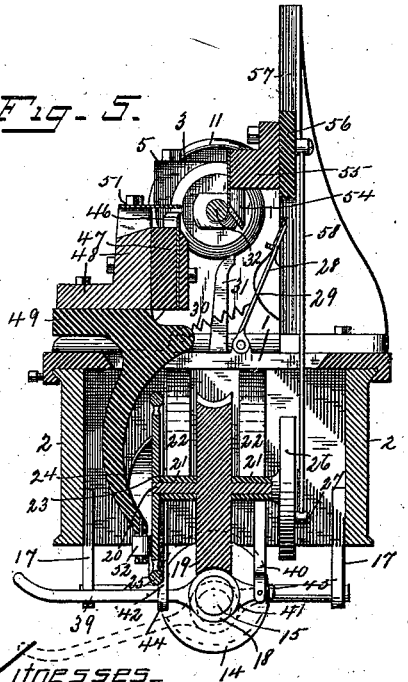

Fig. 6.

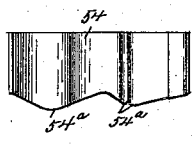

Fig. 7.

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# UNITED STATES PATENT OFFICE.

LYMAN L. HILL, OF BRIDGEPORT, CONNECTICUT.

## WOOD-TURNING LATHE.

SPECIFICATION forming part of Letters Patent No. 377,617, dated February 7, 1888.

Application filed June 13, 1887. Serial No. 241,102. (No model.)

*To all whom it may concern:*

Be it known that I, LYMAN L. HILL, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Wood-Turning Lathes; and I do hereby 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 has for its object to simplify and improve the construction of this class of lathes, so that the lathe itself will perfect the articles upon which it works, rendering additional operations—such as sandpapering, &c.—wholly unnecessary, while at the same time the production of the lathe shall be greatly increased, each operation being automatic and much more quickly performed than has heretofore been possible. With these ends in view I have devised the simple and novel construction of which the following description, in connection with the accompanying drawings, is a specification, numbers being used to denote the several parts of the lathe.

Figure 1 is a side elevation of the lathe complete, a portion of the side of the bed being broken away; Fig. 2, a plan view; Fig. 3, a transverse section, on an enlarged scale, showing the position of the parts after a block has been placed in position ready to be acted upon; Fig. 4, a similar view showing the position of the parts at the completion of the action of the first cutter; Fig. 5, a similar transverse section looking in the opposite direction, showing the position of the parts at the completion of the action of the second cutter; Fig. 6, an elevation of the second cutter detached; and Fig. 7 is an elevation of a completed tool-handle corresponding in outline with the outline of the cutters illustrated in these drawings.

1 is the bed, 2 the side pieces, and 3 a stationary head-stock carried by a spindle, 4, journaled in brackets 5, projecting upward from the bed.

6 is a movable head-stock carried by a spindle, 7, journaled in brackets 8 upon slide 9, said slide being adapted to move in ways in a block, 10, upon the bed. Rotary motion is imparted to spindles 4 and 7 by belts, (not shown,) which extend from a main or counter shaft (not shown) and pass over pulleys 11 on said spindles.

12 denotes a series of pulleys on spindle 4, and 13 a belt connecting said pulleys with a corresponding series of pulleys, 14, on a shaft, 15, beneath the bed.

It will be noticed that the series of pulleys 12 and 14 are arranged inversely to each other, so that I am enabled to change the speed of shaft 15 relatively to the speed of the spindles. This shaft is journaled in an oscillating sleeve, 16, which is pivoted between two brackets, 17, secured to the side pieces. At the inner end of shaft 15 is a worm, 18, which engages a wheel, 19, upon a shaft, 20, journaled in bearings 21, supported by brackets 22, which are secured to the under side of the bed. At one end of shaft 20—the front, as seen in Fig. 1—is a disk, 23, having upon its outer face a cam, 24, and outside of the disk a hand-wheel, 25, for convenience in operating this portion of the lathe by hand. At the opposite end of shaft 20 is a disk, 26, having a crank-pin, 27. The functions of these parts will presently be more fully explained.

28 denotes an L-shaped centering-rest carried by an arm, 29, pivoted to an ear projecting upward from the bed.

30 is a spring connected to arm 29 and to a lug projecting upward from the bed, which acts to draw the centering-rest forward to its operative position.

31 is a stop projecting upward from the bed, which acts to limit the movement of the rest when it is drawn forward by the spring. In use the block to be operated upon (indicated by 32) is placed upon the centering-rest, one end of it lying in contact with the chuck 33 of the stationary head-stock. The chuck 34 of the sliding head-stock is then moved against the other end of the block by means of a hand-lever, 35, pivoted to slide 9, and also pivoted loosely to block 10, as clearly shown in Fig. 2.

It will of course be understood that the special shape of the centering-rest is not of the essence of my invention. As handles and other small wood articles are usually turned from rectangular blocks, the back and bottom of the rest are usually at right angles to each

other, as clearly shown. When the hand-lever is moved from the position shown in dotted lines to the position toward the left shown in full lines, it is obvious that the block will be held firmly by the two chucks. As soon as motion is communicated to the head-stocks and chucks it will be apparent that the block must act to throw the centering-rest backward out of the way. In order to hold it out of the way during the operations upon the block, I provide a spring-rack, 36, the normal position of which is indicated by dotted lines in Fig. 2—that is, out of engagement with the centering-rest—so that spring 30 is free to draw the latter forward.

37 denotes a spring carried by a rod, 38, at the inner end of the slide. When the slide is moved to its operative position, the rod passes through an opening in the rack, as clearly shown in Fig. 1, leaving the spring free to bear against the rack to force and hold the latter in engagement with the centering-rest, the rod serving merely as a guide for the spring. As soon as the centering-rest is thrown backward out of the way by the rotation of the block the rack engages it again and holds it there. In use the two head-stocks and chucks are continuously in movement. As already stated, shaft 15 below the bed is journaled in an oscillating sleeve.

39 is a lever, the rear end of which is pivoted to a bracket, 40, under the bed. This lever is provided with a collar, 41, through which shaft 15 passes.

42 is an L-shaped lever pivoted to one of the brackets under the bed. One arm of this lever extends inward, and is adapted to be engaged by a lug, 43, on hand-wheel 25, and the other extends downward and is provided with a hook, 44, which is engaged by hand-lever 39 when it is desired to operate the cutters.

The operation of this portion of my invention will be apparent from Figs. 1 and 5.

It will be seen that sleeve 16, by which shaft 15 is carried, has sufficient movement to permit the worm to drop down out of engagement with wheel 19. The rear end of hand-lever 39, which I have denoted by 45, engages bracket 40, as shown in Fig. 5, and acts as a stop to limit the downward movement of shaft 15.

46 denotes the first or roughing cutter carried by a block, 47, which is vertically adjustable upon a block, 48, which is itself adjustable in the opposite direction upon a swinging rest, 49, pivoted to ears 50 upon the bed. The edge of this cutter is straight in the plane parallel to the plane of rotation of the chucks and is curved in the plane at right angles to the plane of rotation of the chucks, so as to give the desired shape to the block being acted upon, the direction of its cut being toward or slightly below the center of the plane of the rotation of the chucks.

51 is a guard secured to the top of block 48, which rests against the block to be operated upon and prevents the cutter from making too deep a cut. Rest 49 extends downward through an aperture in the bed, and its lower end engages cam 24 upon disk 23, which causes the rest to swing in and out, thus throwing cutter 46 into and out of operative position. A roller, 52, is preferably provided at the lower end of the rest to lessen the friction upon the cam.

The operation of this portion of my invention will be clearly understood by reference to Figs. 3 and 4.

53 is a stump projecting backward from the swinging rest, which comes in contact with the centering-rest at the position to which it has been thrown by the rotation of the block that is being operated upon, and carries it still farther back to the position shown in Figs. 4 and 5, so that it will be entirely out of the way during the operation of the second cutter, which I will now describe.

54 denotes the second or finishing cutter, which is adjustably secured to a block, 55, carried by a slide, 56, adapted to move in ways 57. The line of movement of this cutter is of course not directly toward the center of the block being acted upon, as is the case with the roughing-cutter, its action being to impart the final finish to the handle by the removal of the rough surface of the block as left by the roughing-cutter. Its line of movement is therefore at one side of the center of rotation of the chucks, and its edge is curved in the plane parallel to the plane of rotation of the chucks to correspond to the contour of the handle and to impart the final beads and finishing-lines thereto. The necessary movement is imparted to this slide by a rod, 58, pivoted to the slide and also to crank-pin 27 upon disk 26.

It will be noticed from Figs. 3 and 4 that the operations of the crank-pin and cam are so timed as to bring the second cutter into operation the instant after the action of the first cutter is finished. The special action of the first cutter upon the block is the same as usual in this class of lathes. Heretofore, however, no matter how many cutters of this class have been used, it has been necessary to supplement the action of the cutters by other finishing operations, in order to produce a handle or other article suitable for the market. This I accomplish perfectly, rendering all additional finishing operations unnecessary, by the special conformation of the edge of the second cutter. The principle involved is that of so forming the cutting-edge that there will be one or more projecting portions, $54^a$, (preferably two at least,) between the ends of the cutting-edge, that will come in contact with the highest portion of the partly-finished block first, so that the action of the cutting-edges will be in both directions from the highest portion of the article, the effect of which is to insure a shearing cut with the grain in both directions simultaneously, so that, no matter whether the grain of the piece of wood is straight or irregular, the danger of chipping out pieces is wholly avoided. Suppose that there are two projecting portions, each acting in both directions, it will be apparent that the travel of the cutter

only requires to be one-fourth what it is in ordinary lathes, in which the cut is in one direction only and from one end of the handle to the other, instead of from two projecting points and in both directions from each. Any number of projecting portions may be used. In turning ordinary small articles—such as handles—two will be found quite sufficient. In practice with a finishing-cutter of this class I speed the lathe so high that the cutters act at least four times as fast as is possible in ordinary lathes, thus, in fact, multiplying the product of the lathe by four and producing perfectly-finished work.

59 denotes a supplemental cutter secured to slide 56, by means of which I produce the ordinary ornamental lines on a tool handle, as clearly indicated in Fig. 7.

The operation of the entire machine is briefly as follows: Having placed the block to be operated upon in position on the centering-rest, hand-lever 35 is moved inward toward the left, which causes the two chucks to engage the block and hold it firmly. Hand-lever 39 is then raised and engaged with hook 44 upon the L-shaped lever under the bed. This throws worm 18 into engagement with wheel 19 and imparts rotation to the latter. An instant later cam 24 acts upon swinging rest 49 to throw the first cutter inward into operative position. At the instant the operation of this cutter is finished the second cutter is moved downward into operative position by the crank and rod. At the instant the operation of this cutter is finished lug 43 on the hand-wheel will engage the upper arm of the L-shaped lever 42 and trip the latter, thus disengaging hand-lever 39 and permitting the worm upon shaft 15 to drop out of engagement with wheel 19. Hand-lever 35 is then moved to the right again, as shown in dotted lines in Figs. 1 and 2, which releases the finished article from the chucks and allows it to drop down through the usual opening in the bed. As soon as the slide is moved backward by the hand-lever, rack 36 moves backward to the position shown in dotted lines, which permits spring 30 to draw the centering-rest into operative position again, ready to receive another block. These operations are continuously repeated, and the completed articles are turned out about as fast as the three motions of placing a block in position and operating levers 35 and 39 can be performed.

It will of course be understood that when hand-lever 39 is disengaged from the L-shaped lever and shaft 15 has dropped to the position shown in dotted lines in Fig. 1 belt 13 will pass loosely over pulleys 14 without imparting motion to the lower shaft, and through that to the cutters.

Should it be desired to perform the operations of turning an article by hand, it may be done readily by rotation of hand-wheel 25. This wheel is fast upon shaft 20, and will move the cutters in the same manner as if the worm were in engagement with wheel 19.

I do not of course desire to limit myself to the exact details of construction shown and described, as it is obvious that they may be greatly varied without departing from the spirit of my invention.

I claim—

1. In a lathe, the combination, with a stationary head-stock and a sliding head-stock, both provided with chucks, of a movable centering-rest for carrying the block to be operated upon and a stop which said centering-rest engages when the block is in position to be engaged by the chucks.

2. The stationary and sliding head-stocks and chucks, in combination with a pivoted centering-rest, a spring for drawing it into operative position, a stop to limit its movement, and a spring-rack whereby it is engaged and held when out of operative position.

3. The stationary head-stock and a slide carrying another head-stock, in combination with a pivoted centering-rest, spring-rack 36, and a spring upon the slide by which the rack is caused to engage the centering-rest when out of operative position.

4. The stationary and sliding head-stocks, in combination with a pivoted centering-rest, spring 30, adapted to draw it forward, and stop 31, whereby its forward movement is limited.

5. The stationary and sliding head-stocks, in combination with a pivoted centering-rest, spring-rack 36, and spring 37 upon the slide, by which the rack is forced into engagement with the centering-rest.

6. Stationary head-stock 3, slide 9, carrying head-stock 6, and a spring and rod, 37 38, in combination with a pivoted centering-rest, spring 30, and stop 31.

7. The combination, with stationary and sliding head-stocks and a movable centering-rest, of swinging rest 49, a cutter, 46, carried thereby, and slide 56, carrying cutter 54.

8. The combination, with the head-stocks, of cutter 46, swinging rest 49, to which it is adjustably secured, guard 51, also secured to said rest, which regulates the depth of the cut, and a cam for moving the cutter into operative position.

9. In a lathe, the combination, with the head-stocks and spindles, of a roughing-cutter and a finishing-cutter, each arranged in a plane parallel to a plane passing through the spindles, the roughing-cutter consisting of a plate having its edge curved in the plane thereof to impart the desired shape to the block, and the finishing-cutter mounted in a carriage and consisting of a plate lying generally in one plane and having its edge formed with curved indentations and projections to correspond to the curvature of the edge of the roughing-cutter and waved crosswise of the general plane of the plate, in order, as said cutter moves forward, to engage the highest portions of the block, and from said highest portions cut with the grain in both directions simultaneously.

10. A finishing-cutter for lathes, consisting

of a plate lying generally in one plane and having its edge formed with curved indentations and projections to correspond to the curvature of the block to be finished and waved crosswise of the general plane of the plate, so that in use the projections will engage the highest portions of the block and cut with the grain in both directions simultaneously.

11. The combination, with the head-stocks and the swinging rest carrying the roughing-cutter and having a stump, 53, of slide 56, carrying the finishing-cutter, and a movable centering-rest for the block to be acted upon, which is engaged by stump 53 as the swinging rest moves forward, whereby the centering-rest is carried out of the way before the movement of the slide commences.

12. The combination, with the swinging rest carrying cutter 46, and slide 56, carrying cutter 54, of shaft 20, having at one end a cam which engages the swinging rest to operate cutter 46 and at its other end a crank and a rod connecting it to the slide to operate cutter 54.

13. In a lathe, the combination, with swinging rest 49 and slide 56, of shaft 20, having a worm-wheel, a cam for operating the swinging rest, and a crank for operating the slide, and shaft 15, having a worm, 18, engaging the wheel, whereby motion is communicated to the parts.

14. In a lathe shaft, 20, having a worm-wheel, and a hand-wheel having a lug, 43, a shaft, 15, journaled in an oscillating sleeve and having a worm engaging said worm-wheel, in combination with a hand-lever having a collar through which shaft 15 passes, and an L-shaped lever, 42, having a hook on one end adapted to engage the hand-lever to hold the worm in contact with the wheel, the other arm of lever 42 being adapted to be engaged by lug 43, whereby it is tripped and the worm disconnected at the completion of the operation.

15. In a lathe, the combination, with the cutters, a worm-wheel, and intermediate actuating mechanism, of a shaft journaled in an oscillating sleeve and having a worm adapted to engage said wheel, and a lever having a collar through which said shaft passes, whereby the worm is thrown into and out of engagement with the wheel.

16. The combination, with worm-wheel 19 and shaft 15, having worm 18, of an oscillating sleeve, 16, in which said shaft is journaled, a lever, 39, having a sleeve through which said shaft passes, and means, as a lever having a hook adapted to engage lever 39, whereby the worm is held in engagement with the wheel.

17. Shaft 20, carrying a worm-wheel, and a hand-wheel having a lug, 43, in combination with shaft 15, having worm 18, an oscillating sleeve in which said shaft is journaled, lever 39, having a collar through which the shaft passes, and lever 42, having a hook adapted to engage lever 39, whereby the worm is held in engagement with the wheel until lever 42 is tripped by lug 43.

In testimony whereof I affix my signature in presence of two witnesses.

LYMAN L. HILL.

Witnesses:
A. M. WOOSTER,
C. E. RUGGLES.