(No Model.)

A. WOOD.

LATHE.

No. 291,455. Patented Jan. 1, 1884.

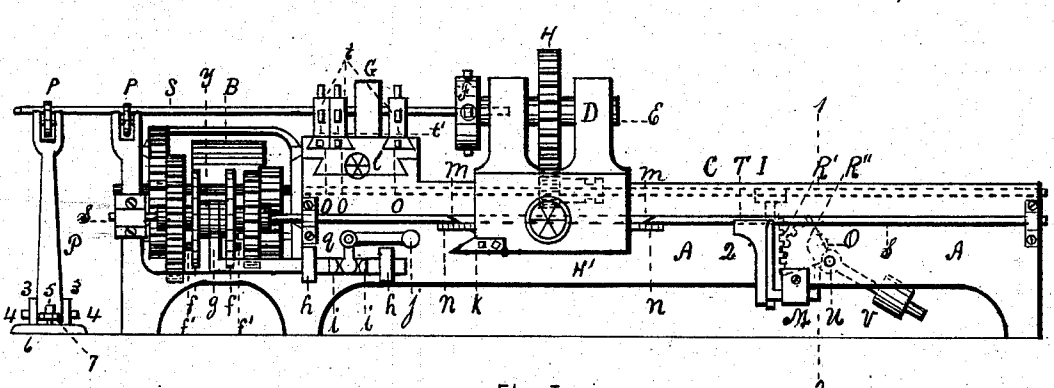


Fig. 1.

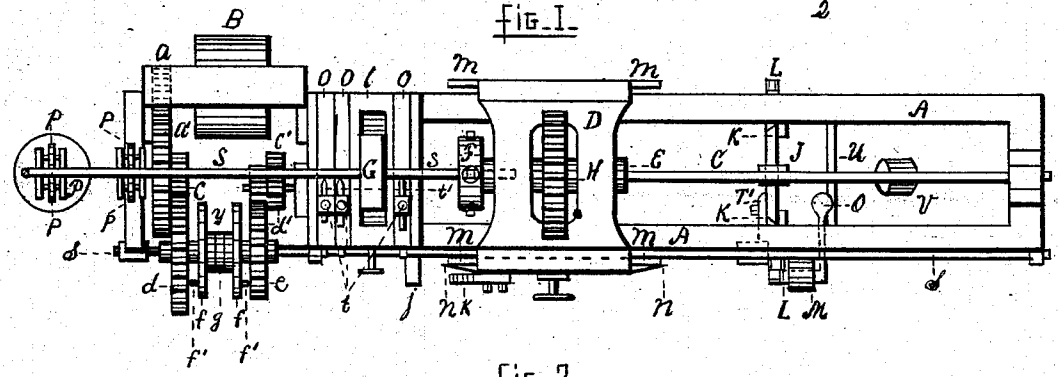


Fig. 2.

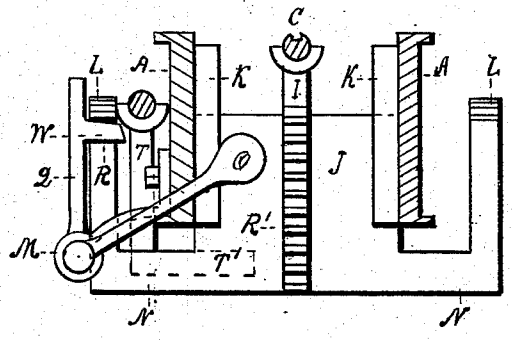


Fig. 3.

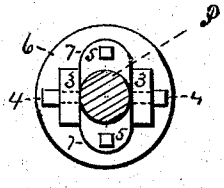


Fig. 4.

Witnesses.

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AURIN WOOD, OF WORCESTER, MASSACHUSETTS.

LATHE.

SPECIFICATION forming part of Letters Patent No. 291,455, dated January 1, 1884.

Application filed December 22, 1882. (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 Shaft-Turning Lathes, of which the following is a specification.

My invention relates to an improved mode of turning metal shafts; also, to certain improvements in shaft-turning lathes having a stationary tool-rest and a traversing or movable puppet; and the objects of my invention are, first, to provide a means of turning a metal shaft which shall obviate the necessity of supporting it upon centers; second, to enable shafts to be turned which are longer than the lathe-bed; third, when two or more turning-tools are used, to provide facilities for their adjustment relatively to each other, and also for their simultaneous adjustment to the shaft to be turned; fourth, to throw the "reverse feed" of the screw or feed shaft out of gear automatically when the head stack or puppet has been run back to the tool-holder; fifth, to provide an improved method of supporting the driving and feed shafts in long lathes.

The mechanism embodying my invention is illustrated in the accompanying drawings, in which Figure 1 shows a front elevation of my improved lathe; Fig. 2, a plan view of the same, and Fig. 3 a detailed view of a portion of the device for supporting the shafts. Fig. 4 shows the base of post P.

Similar letters refer to similar parts in the several figures.

A is the bed, upon the upper surface of which, in suitable guides, the head-stock or puppet D traverses. Power is imparted to the pulley B, and, through the gear-wheels *a* and *a'*, to the central driving-shaft, C, extending the entire length of the lathe-bed. By the pinion *c* motion is given to the gear-wheel *d*, and by the pinion *c'* and the intermediate *d'*, a reverse motion is given to the gear-wheel *e*. These gears *d* and *e* run loosely upon the feed-shaft S, which has a screw-thread nearly its whole length. Between the gears *d* and *e*, I place the clutch-coupling *y*, consisting of a barrel having the two heads or plate-wheels *f f* provided with the engaging-pins *f' f'*. This coupling is furnished with a key fitting a groove in the shaft S, which permits it to slide on the shaft but communicates its rotary motion to the shaft S. Pivoted upon the side of the lathe-bed is the bell-crank lever *q* having a handle, *j*, on the end of its long arm, while the motion of its short arm acting upon the bosses *i i*, slide the bar *g* in the supporting-guides *h h*. The opposite end of the bar *g* is bent at right angles and made to embrace the barrel of the sliding clutch-coupling *y*, enabling the operator, by means of the handle *j*, to put the clutch in connection with either of the two gear-wheels *d* or *e*, and thus impart a right or left hand motion to the screw-thread on the shaft S.

The puppet D carries a hollow spindle, E, gear-wheel H, and chuck F, all driven by a sliding pinion, H', Fig. 1, on the main driving-shaft C. The pinion H', by means of a grooved neck and a yoke or bar attached to the puppet D, is made to slide on the shaft C, to accompany the puppet D as it traverses the lathe-bed. This construction is not shown in detail, it having been shown and described as a feature of my invention in Letters Patent granted to me March 24, 1874, No. 149,020.

The support G for the bar *s* to be turned, Figs. 1 and 2, contains an ordinary ring or collar, or yielding jaws, such as are described in the patent above named, or any of the commonly-used devices for the purpose of supporting the shaft against the action of the cutting-tools. The tool posts or holders *t* are placed upon slides *o o o*, each constructed and operated in the same way as the ordinary slide tool-rests in common lathes, thereby allowing each of the tools *t'* to be adjusted independently of the others. The slides *o o o* rest upon and are operated by a similar slide, *l*, by which the tools may be simultaneously operated. At the end of the lathe and opposite the face of the chuck F, I place upon suitable supports, P, a series of friction-pulleys, *p*, arranged in pairs, for the purpose of supporting the bar *s*. The friction-pulleys *p* are arranged in the usual manner of supporting revolving shafts in anti-friction bearings, and they are placed in such a position as shall bring the bar *s* in a line with the center of the hollow spindle E. The post P has a slight swinging motion laterally, turning upon the pivots 4 4 at the

base. These pivots are held by the projections 3 3 extending upward from the base-plate 6. From each side of the base of the post P project flanges 7 7, which hold the check-screws 5 5, which may be screwed downward, thereby limiting the motion of the post on the pivots 4 4. This lateral motion of the post P is necessary when the bar *s* has any short crooks or other inequalities of surface which would throw the top of the posts out of line as the bar revolves. In order to keep the shaft C and feed-shaft I from sagging in lathes of great length, I use the improved form of support partially shown in detail in Fig. 3.

Between the sides of the lathe-bed A A and sliding in suitable vertical guides, K K, is the plate J, carrying upon its center the shaft-bearing I, and, by an arm attached at T′ and extending outside the lathe-bed, the bearing T for the screw-shaft S. Upon the center of the plate J is the rack R′, whose teeth engage with the toothed sector R″, Fig. 1, which vibrates upon the rod U and is operated by the weighted lever V, causing the plate J and the shaft-bearings I and T to be forced upward and pressed against their respective shafts.

At the bottom of the plate J and projecting outward and upward are the right-angled arms N N, having their upper ends, L, slightly rounded. As the puppet D traverses the lathe-bed the cam-plates *m* attached to the puppet and having their under surfaces inclined are made to pass over and press upon the rounded surfaces L L, counteracting the weighted lever V, and lowering the plate J, and also the two shaft-bearings I and T sufficiently to allow the pinion H′ and the nut on the feed-shaft S to pass. When relieved of the pressure of the cam-plates *m* the plate J is raised by the weighted lever V, bringing the bearings I and T into position, as shown.

The lever Q, turning upon a spindle in the bearing M bolted to the side of the lathe-bed, has a projecting spur, W, which, entering the groove R in the upright arm, forms a latch which maintains the shaft-supports in their position independently of the weighted lever V. The latch is thrown into the position shown by means of the weighted lever O, and at the passage of the puppet D the latch is thrown out by the inclined surfaces *n n* of the cam-plates *m m*, Fig. 2, pressing against the inner surface of the upper end of the lever Q. When the puppet D is being run back toward the tool-holders *t* by the reverse motion of the feed-screw shaft S, its motion is checked automatically at the proper time by the action of the cam-plate *k*, attached to the puppet D, operating by its inclined surface to lift the handle *j* of the bell-crank lever *q*, thus moving the clutch-coupling *y* on the feed-shaft S out of connection with the gear-wheel *d*. By the methods in common use of turning metal shafting, the shaft, after being cut the proper length, is centered, straightened, and while being turned is supported upon centers in the lathe and rotated about an axial line, bringing its surface against the turning-tools which are made to traverse along the lathe-bed. Certain improvements in this mode of operation were made the subject of Letters Patent granted to me March 24, 1874, Number 149,020, by which the shaft was supported at one end upon a center and at the other by a chuck, and the two puppets were made to traverse the lathe-bed while the turning-tools remained stationary. By the present method I adopt a radical change from any of the plans hitherto pursued, and is as follows: The bar of iron, *s*, to be turned, is first straightened by any of the known methods in common use, and one end is turned to the required size for a few inches in height. The bar is then laid upon the friction-pulleys *p*, and the finished end passed through the ring, collar, or yielding jaws in the support G far enough to enable it to be firmly grasped by the jaws of the chuck F. Power is then applied and the tool-holders advanced to their proper position. The clutch-coupling on the feed-shaft S is put in connection with the gear-wheel *e* by raising the handle *j* of the bell-crank lever *q*. Motion being thus given to the screw-shaft S, the puppet D is made to retreat from the cutting-tools, drawing the shaft which is being rotated by the chuck F, thus subjecting successive portions of the surface of the bar to the action of the cutting-tools, the bar of iron being supported by and rotating upon the several pairs of friction-pulleys *p*, thereby allowing the "free" end of the shaft so supported to move laterally whenever a short bend or projecting inequality in the surface of the shaft is brought against the cutting-tools, and this feature of my present method essentially distinguishes it from the method set forth in my Patent No. 149,020, March 24, 1874, the plate J and the shaft-supports I and T being depressed by the cam-plates *m m* as the puppet traverses the lathe-bed. Should the shaft be longer than the lathe-bed the jaws of the chuck may be released and the puppet D run back, the hollow spindle E passing over the finished portion of the shaft, and the shaft grasped by the chuck nearer the tool-holders and another section turned, and this operation may be repeated until the entire length of the bar of iron is turned.

Among many advantages resulting from the above-described mode of turning metal shafts, three may be mentioned of marked superiority: First, the shaft being drawn past the stationary cutting-tools, the strain upon the barbing turned in the action of feeding is one of tension, and the tendency of the bar to spring or buckle, especially in the case of shafts of great length and of small diameter, is entirely obviated; second, shafts may be turned of much greater length than the lathe-bed; third, the shaft does not require centering for either the purpose of straightening or turning, as it is supported by its periphery upon the friction-pulleys *p*, instead of being

suspended between the centers and rotated about an axial line, as in the usual method.

I do not claim the use of a traversing puppet or head-stock with a stationary tool-holder, nor the mode of communicating motion from the driving-shaft C to the spindle E by means of a sliding pinion, H′; nor do I claim any particular mode of steadying the bar *s* and holding it firmly against the cutting-tools at the support G, as I use the yielding jaws described in the patent granted to me March 24, 1874, No. 149,020, or a solid ring or collar such as is in common use for that purpose; neither do I claim any particular mode of construction or operation of the tool-holders *t* and slides *o o o* and *l*, as I use the ordinary devices for operating the common sliding tool-rests in turning-lathes; but

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

1. The combination, in a shaft-turning lathe, of the tool-holders *t*, fixed tools *t′*, traversing puppet D, and supporting-pulleys *p*, as described, and for the purposes set forth.

2. The combination, in a shaft-turning lathe, of the tool-holders *t*, fixed tools *t′*, traversing puppet D, hollow spindle E, and supporting-pulleys *p*, as described, and for the purposes set forth.

3. The combination, in a shaft-turning lathe, of the stationary tool-holders *t*, fixed tools *t′*, and supporting-pulleys *p*, with means for rotating the shaft, as described, and for the purposes set forth.

4. The combination, in a lathe, of two or more cutting-tools, *t′*, separate tool-holders *t*, slides *o o o*, by means of which each tool-holder *t* and its cutting-tool *t′* may be independently adjusted and without loosening the tools in the tool posts or holders, and the slide *l* carrying the slides *o o o*, and by means of which all the tool-holders and their tools may be adjusted conjointly, as and for the purpose set forth.

5. The combination, with the traversing puppet D, of the cam-plate *k*, bell-crank lever *q*, clutch *y*, gear-wheels *d* and *e*, and feed-screw S, all arranged and operating as set forth, and for the purpose specified.

6. The shaft-supports I and T, sliding plate J, rack R′, sector R″, and weighted lever V, in combination with the shafts C and S, as described, and for the purposes set forth.

7. The shaft-supports I and T, sliding plate J, arms N N, weighted lever V, operating as described, and the actuating cam-plates *m m*, attached to the puppet D, as and for the purposes set forth.

8. The combination, with the supports I and T, plate J, arms N N, and groove R, of the latching device consisting of the lever Q, spur W, and weighted lever O, all operating as described, and for the purposes set forth.

9. The combination, in a shaft-turning lathe, of the tool-holders *t*, fixed tools *t′*, traversing puppet D, substantially as described, and means for supporting the free end of the shaft in a horizontal and vertical plane coincident with its axis of rotation, as and for the purpose set forth.

10. In a shaft-turning lathe, the combination of the tool-holders *t*, cutting-tools *t′*, supporting-pulleys *p*, post P, capable of a lateral motion at the top, turning on the pivots 4 4 at the base, and suitable means for rotating the shaft, as and for the purpose set forth.

11. In a shaft-turning lathe, the combination, with a series of supporting-pulleys, of a series of posts, P, with pivots 4 4 at the bottom of each post, so as to allow a slight lateral motion to the top of the post, as and for the purpose set forth.

12. In a shaft-turning lathe, the posts P, flanges 7 7, and check-screws 5 5, as and for the purpose set forth.

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Witnesses:
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