(No Model.) 4 Sheets—Sheet 1.

P. SHELLENBACK.

LATHE FOR BORING AND FACING PULLEYS.

No. 554,147. Patented Feb. 4, 1896.

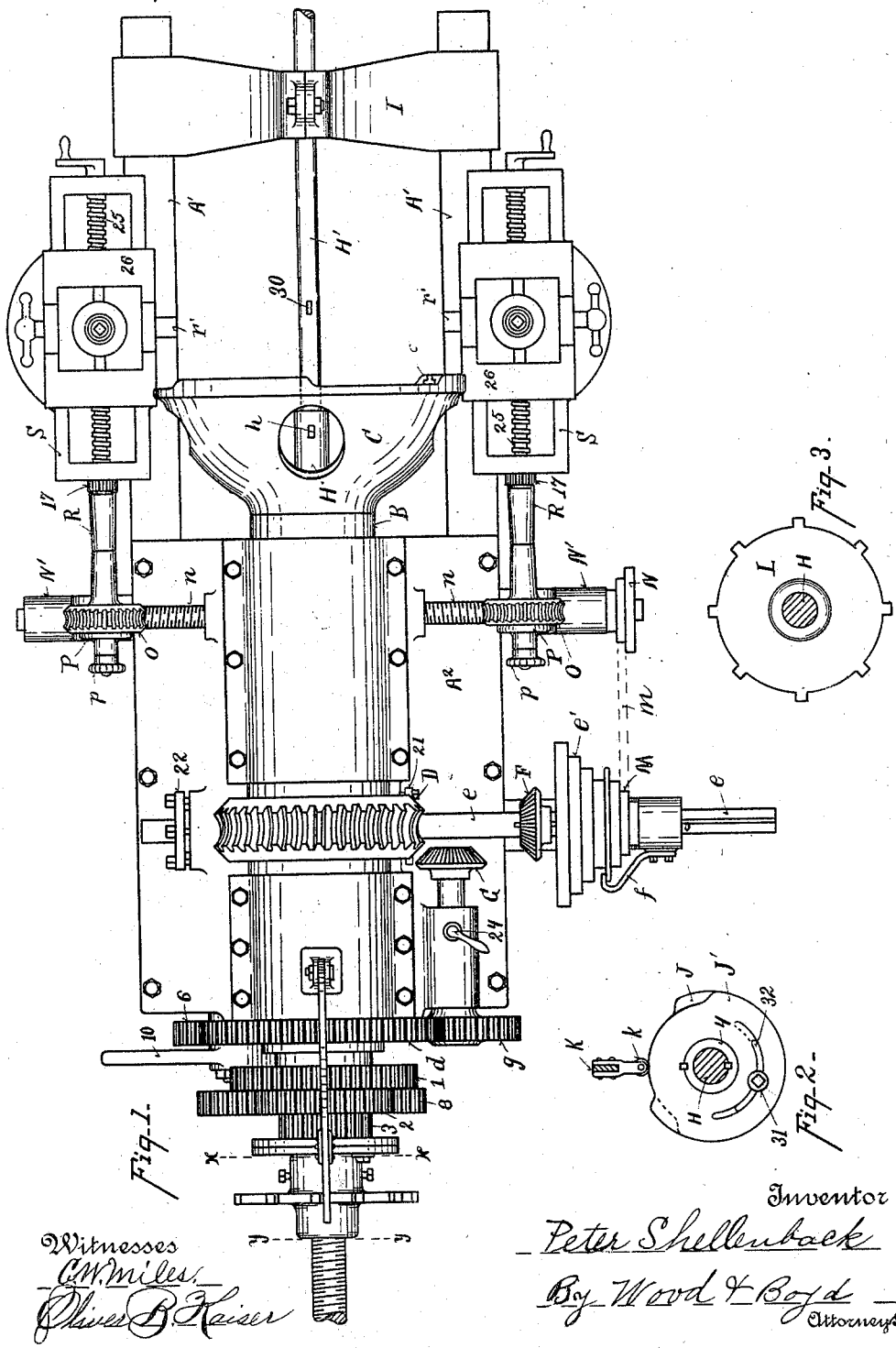

Fig. 1.

Fig. 3.

Fig. 2.

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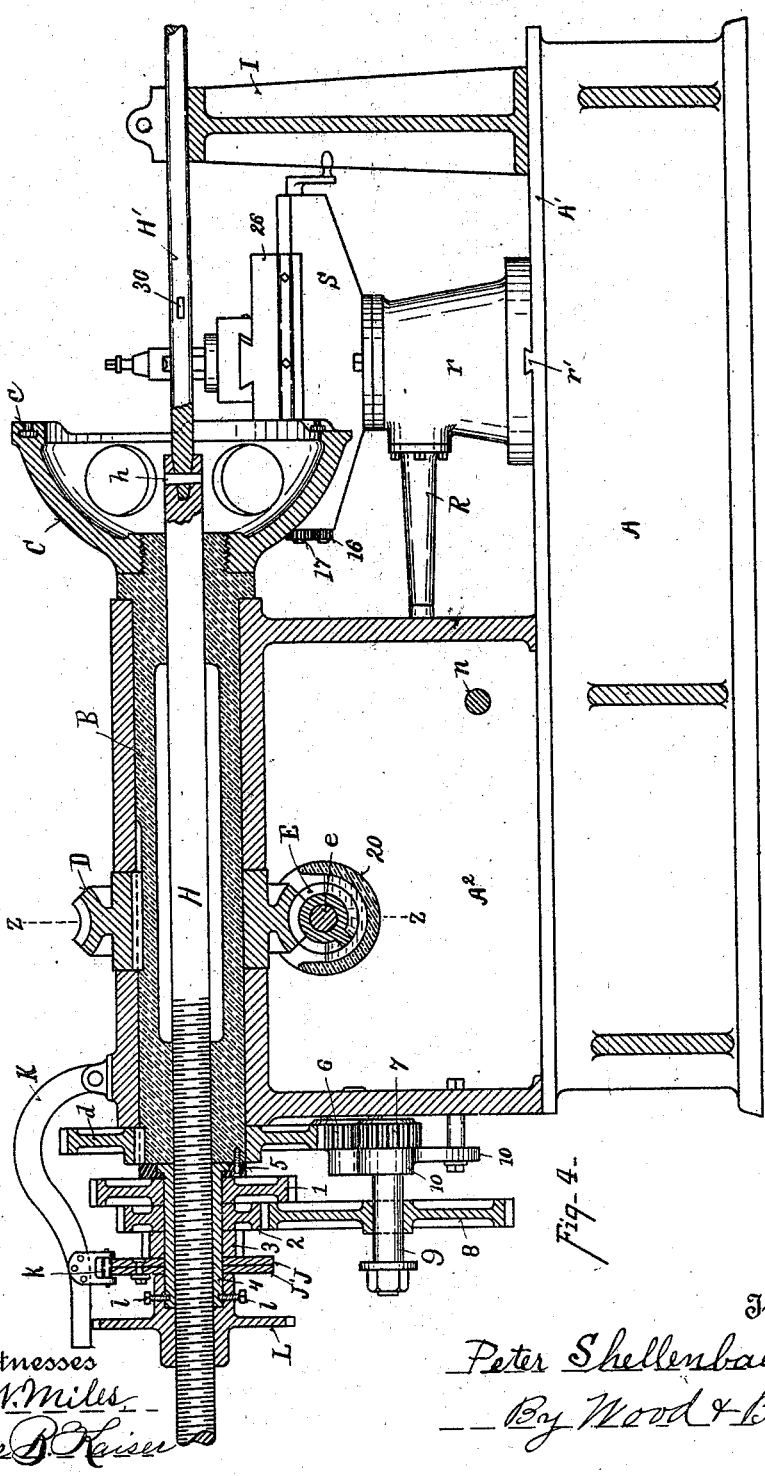

Fig. 4.

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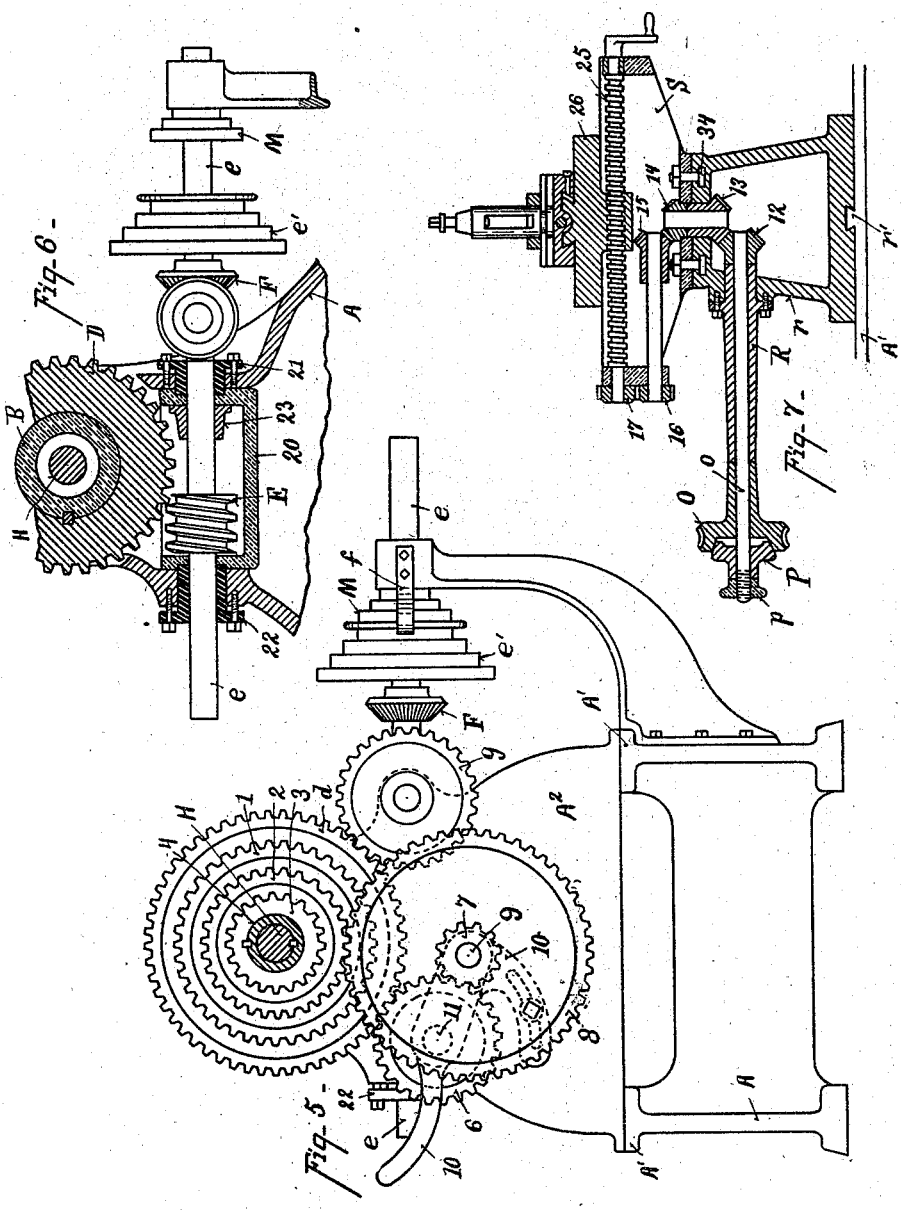

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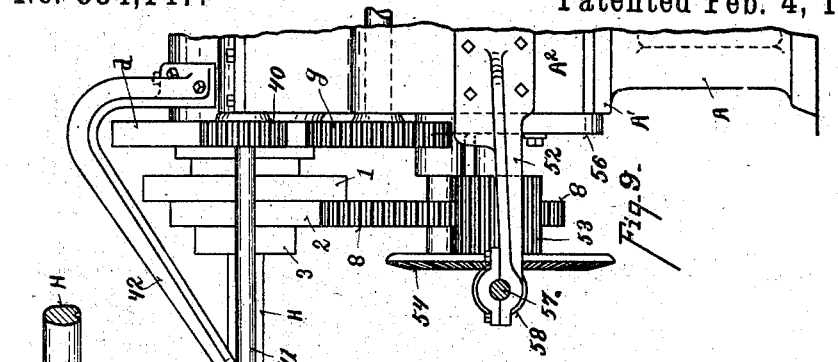

Fig. 9.

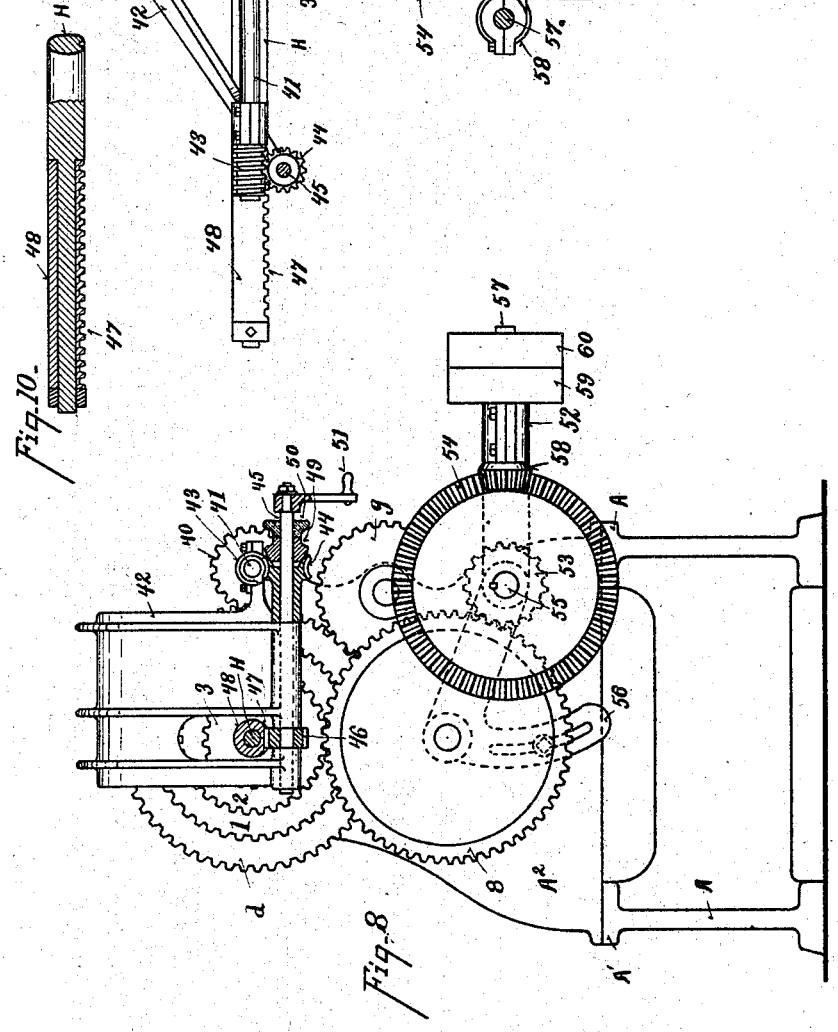

Fig. 8.

Fig. 10.

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UNITED STATES PATENT OFFICE.

PETER SHELLENBACK, OF LIBERTY, INDIANA.

LATHE FOR BORING AND FACING PULLEYS.

SPECIFICATION forming part of Letters Patent No. 554,147, dated February 4, 1896.

Application filed May 15, 1895. Serial No. 549,432. (No model.)

To all whom it may concern:

Be it known that I, PETER SHELLENBACK, residing at Liberty, in the county of Union and State of Indiana, have invented certain new and useful Improvements in Lathes for Boring and Facing Pulleys, of which the following is a specification.

The object of my invention is to provide a lathe for simultaneously boring and facing pulleys and other articles.

Figure 1 is a top plan view of the machine. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a section on line *y y*, Fig. 1. Fig. 4 is a central vertical section. Fig. 5 is a rear end view of the machine. Fig. 6 is a section on line *z z*, Fig. 4. Fig. 7 is a central vertical section through one of the tool-carriages. Fig. 8 is a rear end view showing a modified form of feeding and driving the boring-bar. Fig. 9 is a side elevation of the same. Fig. 10 is a detailed view, partly in section, of the rear end of the boring-bar.

A represents the base of the machine. It is provided with ways A′, upon which the tool-carriage and tail-stock are mounted.

A^2 represents a head-stock frame mounted thereon.

B represents a mandrel; C, a chuck. The chuck is provided with three raised portions *c*, against which the spokes of the pulley rest and are clamped. The mandrel is driven primarily by means of a worm-gear D, splined to the mandrel and geared to a worm E, mounted upon its shaft *e*, and driven by means of a belt upon the cone-pulley *e′*, mounted thereon. When it is desired to increase the speed of the mandrel the cone-pulley *e′* is released from the hook *f* and turned by hand until the worm passes out of engagement with the worm-wheel D, as shown in Fig. 6, when miter-gear F comes into engagement with the miter-gear G and through spur-gears *g d* drives the mandrel at an increased speed. Miter-gear G is held in engagement with the miter F by means of a screw-stud 24, which enters a groove in the shaft of said miter G. The miter G is thrown out of gear by slacking the screw 24, and the miter slips backward, so as to disengage the spur-gears *g d* from each other.

Passing through the center of the mandrel B is a secondary mandrel H, to the forward end of which is secured a boring-bar H′ by means of the pin *h*, the opposite end of the boring-bar being supported in the tail-stock I.

In order to provide a suitable speed for the mandrel H, which by reason of working near the center of the pulley must be faster than that of the tools working on the face of the pulley, a series of gears 1 2 3 are keyed to the sleeve 4, which is clamped to the rear end of the mandrel by means of the grooved collar 5. This sleeve 4 is in turn keyed to the mandrel H, and the sleeve and mandrel are driven by a train of gears 6 7 8 from gear *d*, the gear 6 being mounted upon the stud 11 and meshing with the gear *d*, from which it receives motion and drives gear 7 upon shaft 9, which journals in an adjustable segment 10, mounted upon stud 11. Upon the stud 9 is likewise keyed the gear 8, which by means of the adjustable segment 10 may be engaged with either one of the gears 1 2 3, gear 8 being splined on shaft 9, so as to be moved laterally to engage either of said gears. The tool for turning out the inner periphery of the hub is set in slot 30 of the boring-bar H′.

In order to make a complete revolution of the boring-bar between the intermittent lateral feed-motion I provide the following devices: J J′ represent cam-disks upon sleeve 4. K represents a pendent arm pivoted to the head-stock A^2 and provided with friction-roller *k*, riding upon the cam-disks J J′. L represents a disk provided with a serrated face and a screw-threaded hub engaging with the mandrel H. The hub is recessed at its forward end, so as to slip over the end of the sleeve 4 and is held in position by a series of stud-bolts *l*, which engage with a groove in the end of the sleeve 4.

The operation is as follows: Whenever the friction-roller K drops into the groove in the face of the cam-disks J J′, the outer end of the arm K is allowed to drop, so as to engage the teeth of disk L, thus holding the disk L stationary during the passage of the friction-roller over the depressed surfaces of the cam-disks J J′. As the mandrel H is being continuously rotated, whenever the disk L is held stationary the mandrel is thrust forward to make the feed by means of its engagement with the hub of the disk L. As soon as the arm K is lifted out of engage-

ment with the disk L the disk travels with the mandrel H until it is again engaged by the arm K, which is at the end of the revolution. In order to increase or decrease the amount of feed of the boring-bar, I regulate the width of the depression in the face of the disks J J′ by keying one to the sleeve 4 and securing the other one to it by means of a set-screw 31 in the slot 32 of the disk J′, so that the disk J′ is adjusted by rotation to increase or decrease the time of engagement of the pendent arm K and hence the amount of lateral feed.

In order to turn off the face of the pulley-crowning, I provide two tool-holders, one upon each side of the machine and so arranged as to travel in opposite directions. These tool-holders are driven in the following manner: M represents a cone-pulley upon the shaft *e*, from which motion is transmitted to cone-pulley N upon shaft *n* by means of a belt *m*, this shaft being supported in brackets N′. O represents worm-wheels mounted upon shaft *o*. P represents a friction-clutch, which is engaged and disengaged with the worm-wheel O by means of nut *p*. The shaft *o* is supported in collar R, clamped to the pedestal *r* of the tool-carriage. The tool is reciprocated backward and forward by means of the miter-gears 12 13 14 15 and spur-gears 16 17. The spur-gear 17 is splined upon screw-shaft 25, which engages with a nut on the base of the tool-carriage 26. The pedestal *r* may be shifted to or from the center line of the lathe upon dovetail *r′* and clamped in position. The rails S swivel upon the pedestal *r*, so that the tool may be swung to any convenient position to adapt itself to various angles of work.

The worm E is inclosed in an oil box or housing 20 in order to properly lubricate the worm. This housing is clamped in position by means of the thrust-collars 21 22, which pass through the head-stock frame and enter recesses in the housing 20. 23 represents a thrust-collar against which the worm seats when in operation.

Mode of operation: The pulley is placed in position upon the face of the chuck C and a suitable tool is inserted in the boring-bar. The segment 10 and gear 8 are adjusted to give the mandrel H the desired speed. The tools upon the carriage 26 are set and the friction-clutches P clamped to the worm-gears O which sets the tool-carriage in motion. If a slow speed is desired for the pulley the mandrel B is driven by means of the worm E, shaft *e*, and a belt upon cone-pulley *e′*. If it is desired to give the work a high speed the worm E is disengaged from the worm-wheel, as shown in Fig. 6, and power is transmitted to the mandrel through shaft *e*, miter-gears F G and spur-gears *g d*. If it is desired to face the hub or rim of the pulley the rails may be turned so that the carriage 26 will travel at right angles to the axis of the pulley. This can be accomplished because the miters 12 13 14 15 will form an axis for the rails S, the heads of the bolts 34 being set in the annular T-groove formed in the face of the pedestal *r*. The mandrel H in this case may be idle by disengagement of the gear 8, the mandrel B being revolved to drive the pulley-chuck. It is often desirable to have a continuous feed of the boring-bar instead of the intermittent feed shown in Figs. 1, 2 and 3, and this I accomplish by means of the following devices: 40 represents a spur-gear upon shaft 41, journaled to the frame A^2 at one end and to the bracket 42 at the opposite end and driven from gear *d*. This shaft carries the worm 43 driving the worm-wheel 44 upon shaft 45, likewise journaled in bracket 42. 46 represents a spur-gear engaging with the rack 47 cut in the sleeve 48 swiveled on the outer end of the boring-bar H. 49 50 represent friction-clutch and knurl for engaging and disengaging the worm-wheel 44 with the worm 43. The boring-bar H′ may thus be fed with a continuous feed and engaged or disengaged at will. 51 represents a crank-arm for feeding the same by hand when desired, these parts being substituted for the arm K, disks J J′ L, and screw-thread on mandrel H.

It is frequently more advantageous to drive the mandrel H by means of separate pulleys than from the main driving-pulley, as shown in Figs. 1 and 5. In order to accomplish this purpose I provide a bracket-arm 52 secured to the frame A^2, and to which the spur-gear 53 and beveled gear 54 are journaled upon the shaft 55. 56 represents a segmental arm carrying the gear 8 which meshes with the gear 53, the segment carrying the gear 8 being adjusted to bring the gear 8 into engagement with either of the gears 1 2 3, as desired, while it still remains in engagement with the gear 53. 57 represents a shaft likewise journaled in the bracket 52 and provided at one end with the beveled gear 58 meshing with the beveled gear 54 and at the opposite end with tight and loose pulleys 59 60, whereby the mandrel may be driven by separate belts from the rear end of the lathe.

I obtain several advantages by the construction herein shown and described.

First. The range of speed at which the chuck and mandrel may be driven is such that by employing two different driving-gears—to wit, the worm-gears and the spur-gears—very small or large pulleys can be dressed on the one machine.

Second. The range of feed and speed for moving the tool-carriages and the mandrel is likewise great enough to accommodate itself to the different classes of work.

Third. Pulleys, cones, cylinders and other similar articles may be dressed to any desired angle by the adjustment of the rails S.

Fourth. By employing gears for driving the mandrel H and boring-bar at different ranges of speed the work can be done very fast on small articles or correspondingly slower on larger articles.

Fifth. By employing two swiveling tool-rails S the two planes of crowning-pulleys can be dressed simultaneously.

Sixth. By means of the driving-gears the mandrel H can be driven at any desired varying speed in an opposite direction from the travel of the mandrel B.

I claim—

1. In a machine for dressing pulleys, the combination with a mandrel and a chuck, of the alternating driving mechanism consisting of a worm-gear D splined on the mandrel, the driven shaft *e*, the worm E mounted on said shaft and adapted to be thrown into and out of engagement with said worm-gear, a beveled gear F rigidly mounted on the shaft *e*, and a corresponding beveled gear G adapted to be engaged and disengaged by the gear F, and a train of spur-gears driven by said beveled gears and operating to drive the mandrel when the worm is thrown out of gear with the worm-gear, substantially as described.

2. In a machine for dressing pulleys, the combination with a mandrel and a chuck, of the alternating driving mechanism consisting of a worm-gear D splined on the mandrel, the driven shaft *e*, the worm E mounted on said shaft and adapted to be thrown into and out of engagement with said worm-gear, a beveled gear F rigidly mounted on the shaft *e*, a shaft longitudinally adjustable in bearings at a right angle to the shaft *e*, a beveled gear G carried by said shaft and adapted to be thrown into and out of engagement with the beveled gear F, and spur-gearing actuated by said shaft and operating to drive the mandrel when the worm is thrown out of gear with the worm-gear, substantially as described.

3. In a machine for dressing pulleys, the combination with a mandrel and a chuck, of the alternating driving mechanism consisting of a worm-gear D splined on the mandrel, the longitudinally-adjustable driven shaft *e*, the worm E mounted on said shaft, mechanism for adjusting said shaft longitudinally to throw the worm E into and out of engagement with said worm-gear, a beveled gear F rigidly mounted on the shaft *e*, a corresponding beveled gear G adapted to be engaged by the gear F, and a train of spur-gears driven by said beveled gears and operating to drive the mandrel when the worm is thrown out of gear with the worm-gear, substantially as described.

4. In a machine for dressing pulleys, the combination with a hollow mandrel B carrying a chuck, of the mandrel H centrally arranged within the mandrel B and carrying a boring-bar H′, a sleeve 4 splined on the mandrel H, a series of transmitting-gears splined upon said sleeve and operating to drive the mandrel H at varying speeds, and mechanism for feeding said mandrel H forward at varying speeds, substantially as described.

5. In a machine for dressing pulleys in combination with the inner mandrel H, the sleeve 4 splined thereto, one or more gears splined upon said sleeve, and the intermittent feeding device consisting of the disk nut L, cam J, and arm K, substantially as specified.

6. In a machine for dressing pulleys, the combination with the screw-threaded mandrel H, the sleeve 4 splined thereto, one or more gears splined upon said sleeve, and the intermittent feeding device consisting of the disk nut L, the cam-disks J, J′, adjustably connected to each other and one of which is secured to said sleeve, and the arm K in engagement with said cam-disks and operated by the latter to engage and disengage said disk nut, substantially as described.

In testimony whereof I have hereunto set my hand.

PETER SHELLENBACK.

Witnesses:
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