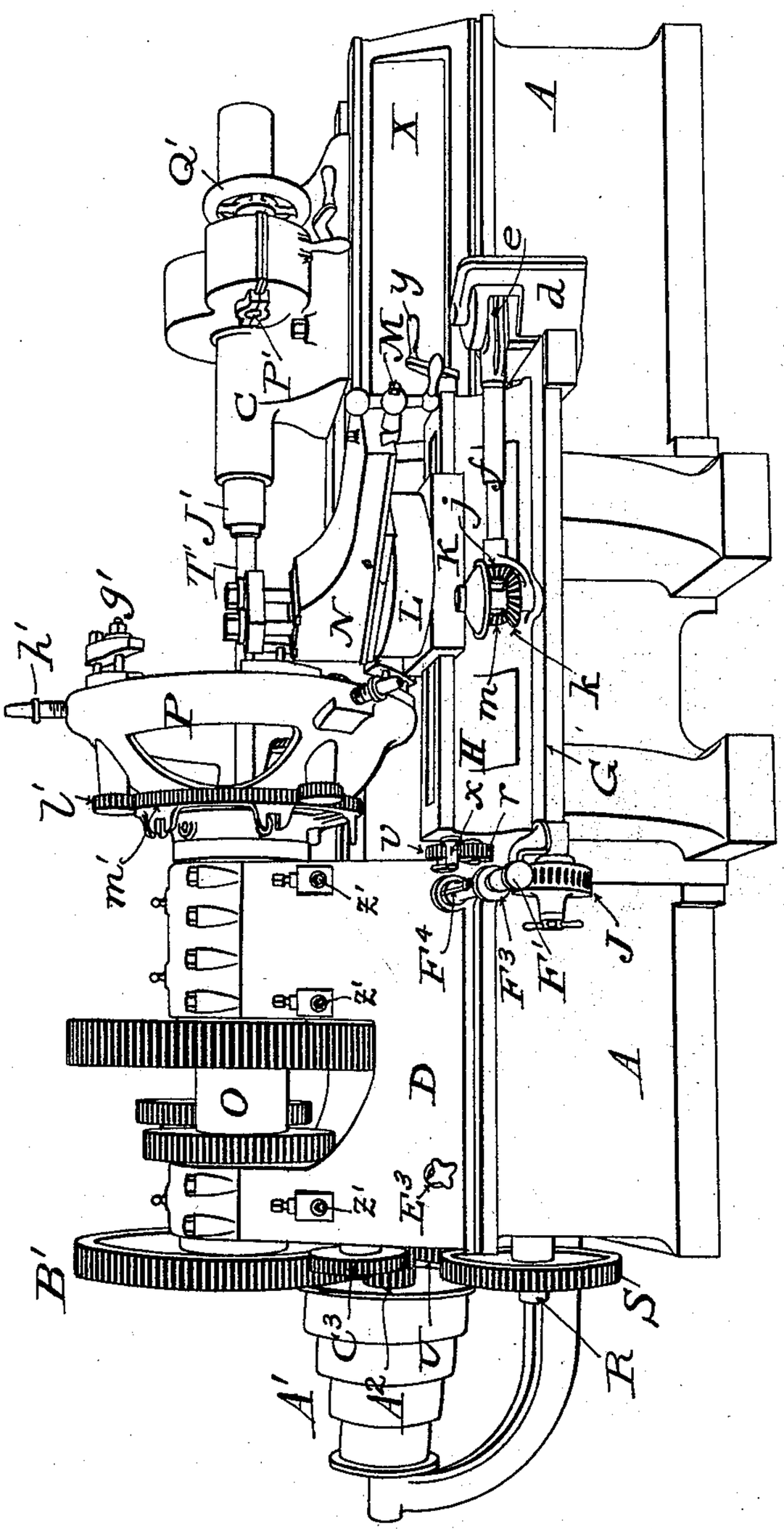
(No Model.) 5 Sheets—Sheet 1.

M. C. HENLEY.

PULLEY LATHE.

No. 506,398. Patented Oct. 10, 1893.

Fig. 1.



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Horace A. Dodger.

M. C. HENLEY

INVENTOR

by Dodger & Sons

Attys.

(No Model.) 5 Sheets—Sheet 2

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PULLEY LATHE.

No. 506,398. Patented Oct. 10, 1893.

Fig. 2.

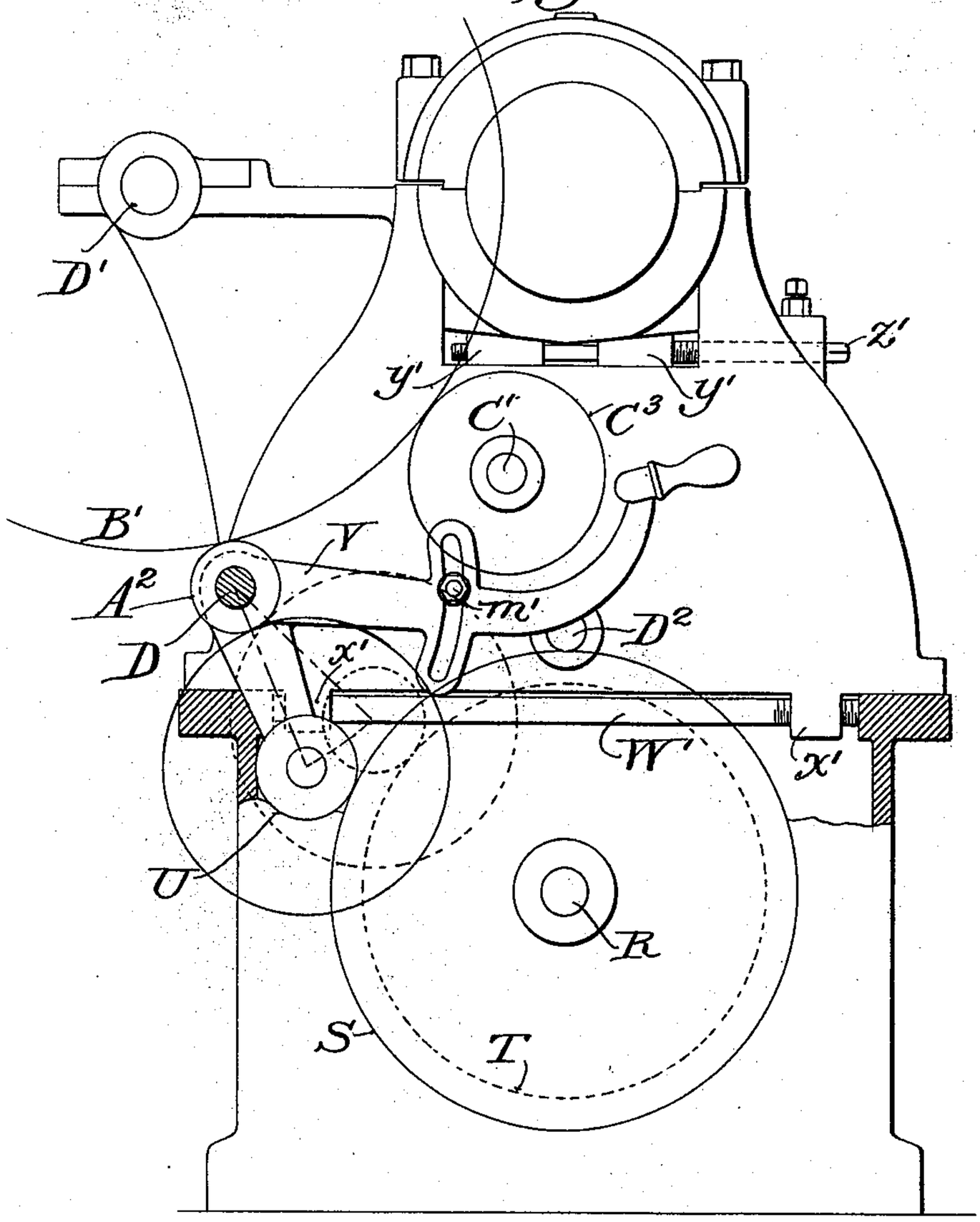
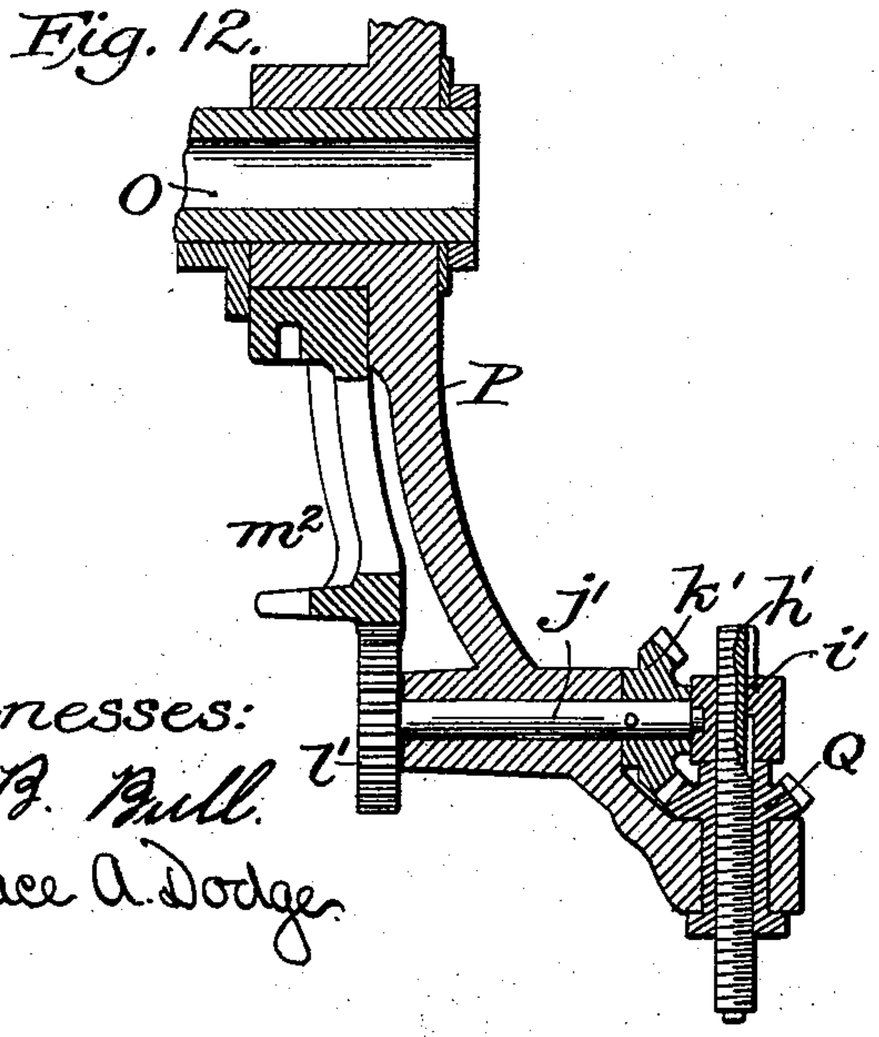


Fig. 12.



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(No Model.) 5 Sheets—Sheet 4.

M. C. HENLEY.

PULLEY LATHE.

No. 506,398. Patented Oct. 10, 1893.

Fig. 8.

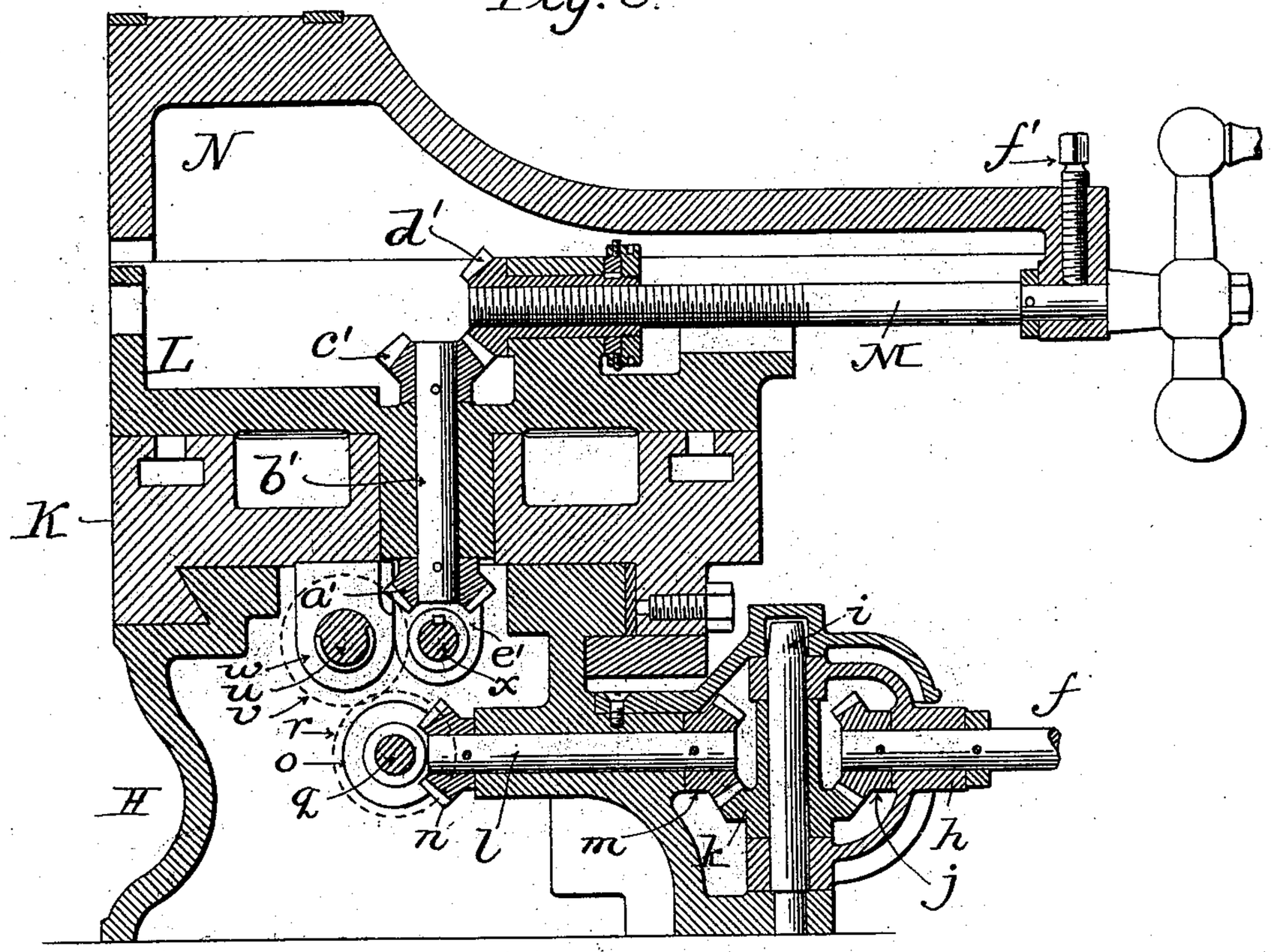
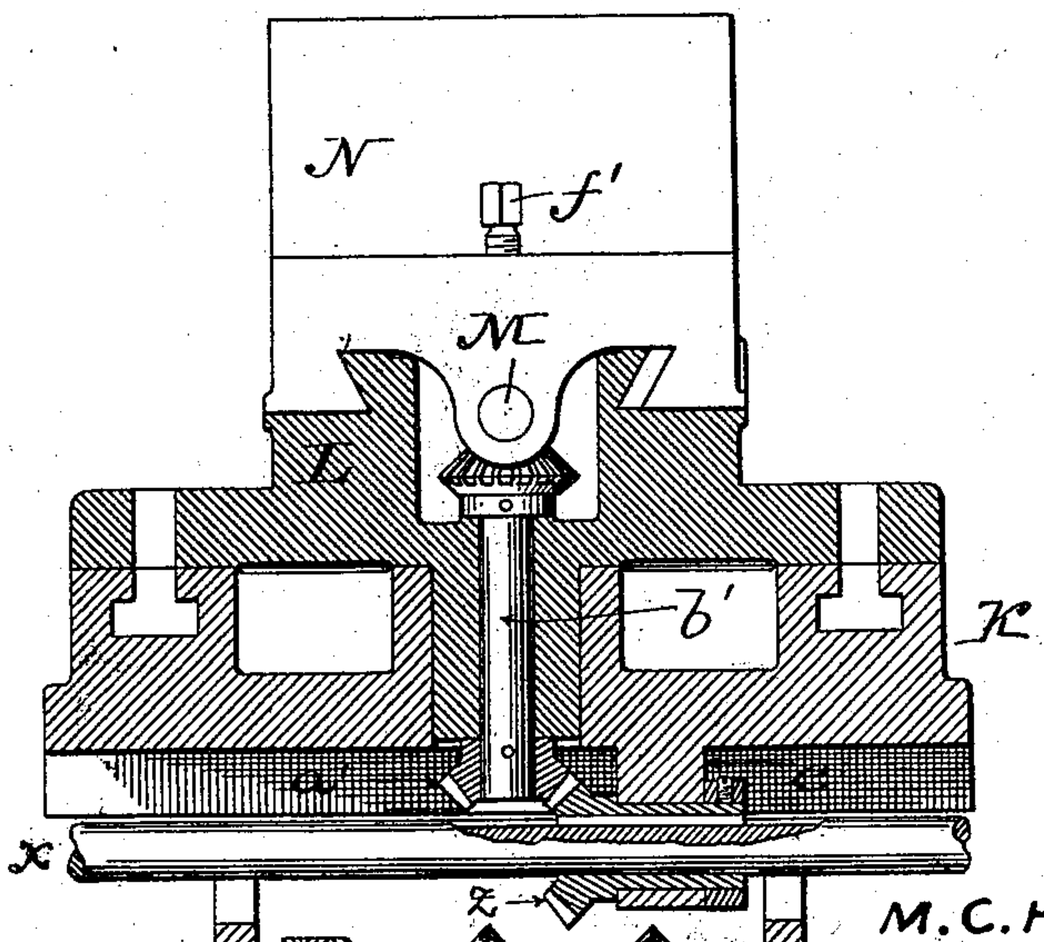


Fig. 9.



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(No Model.) 5 Sheets—Sheet 5.

M. C. HENLEY.

PULLEY LATHE.

No. 506,398. Patented Oct. 10, 1893.

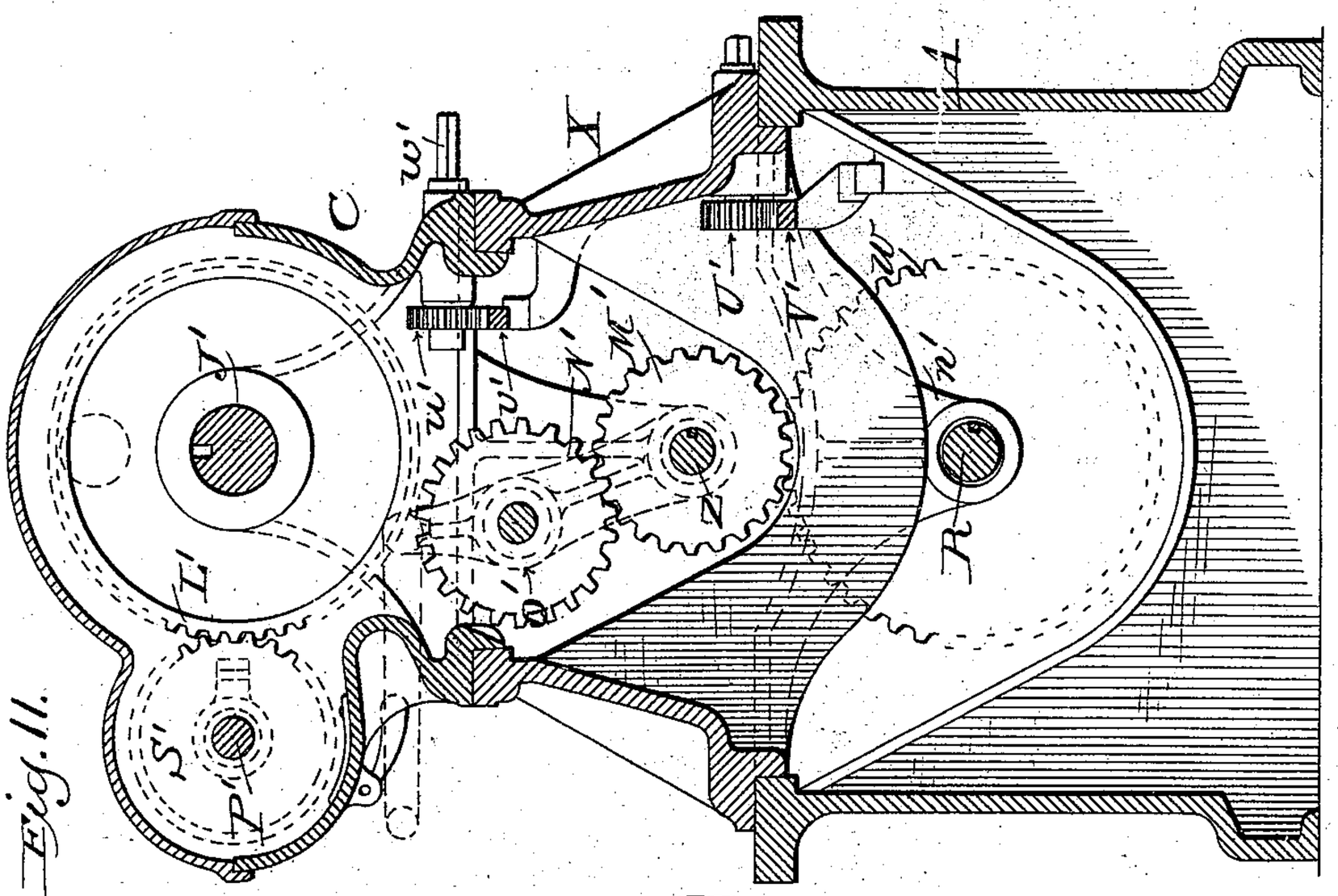

Fig. 11.

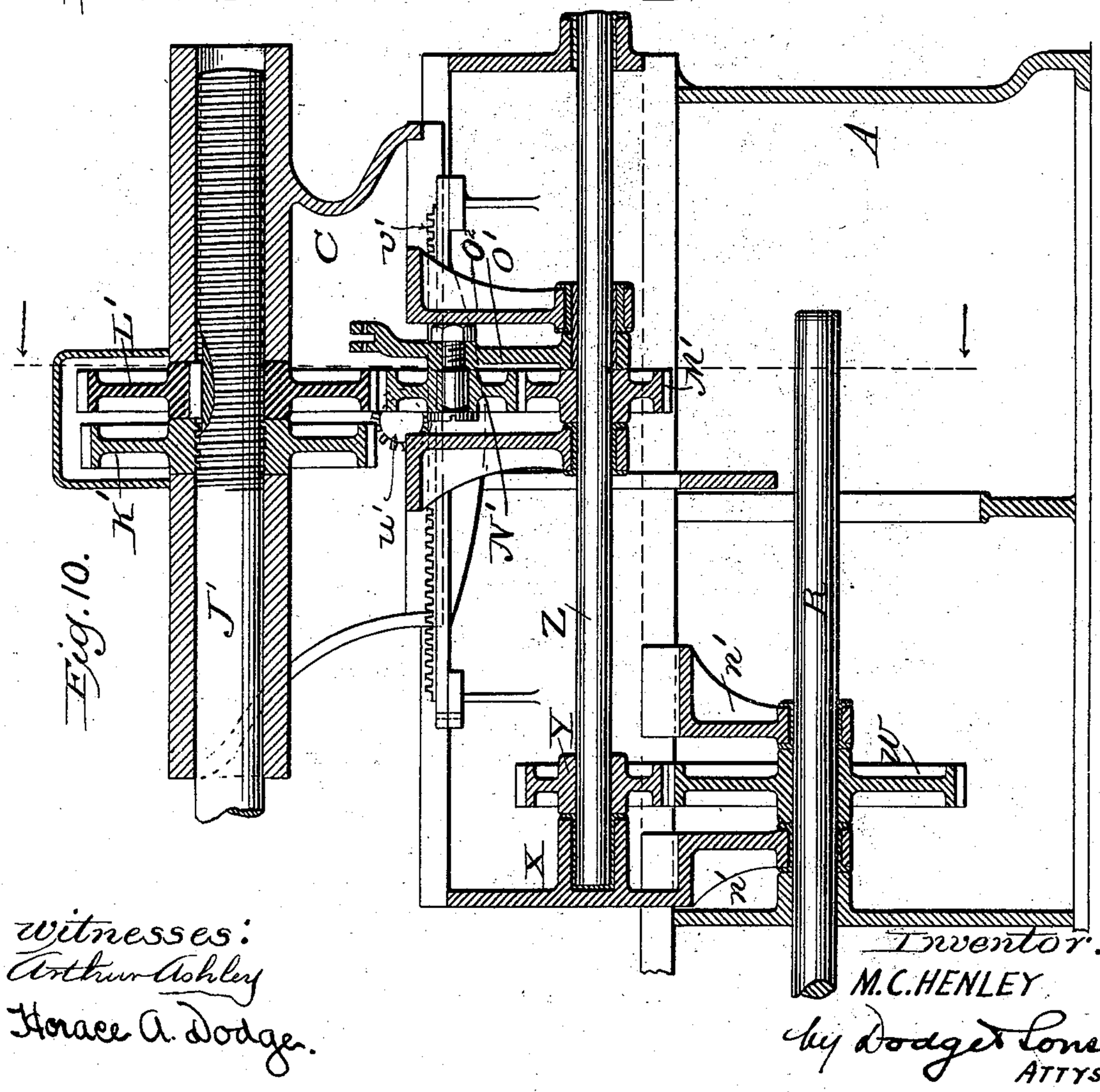

Fig. 10.

Witnesses:
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Inventor:
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by Dodger Lowe
Attys.

UNITED STATES PATENT OFFICE.

MICAJAH C. HENLEY, OF RICHMOND, INDIANA.

PULLEY-LATHE.

SPECIFICATION forming part of Letters Patent No. 506,398, dated October 10, 1893.

Application filed June 10, 1893. Serial No. 477,210. (No model.)

To all whom it may concern:

Be it known that I, MICAJAH C. HENLEY, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Pulley-Lathes, of which the following is a specification.

My invention relates to pulley lathes, and consists in various improvements upon the machine represented in Letters Patent No. 446,448, issued to Henley and Shellenback.

In the drawings,—Figure 1 is a perspective view of my improved machine; Fig. 2, an end elevation, partly in section; Fig. 3, a plan view, with various parts in section; Figs. 4, 5, 6, and 7, views illustrating in detail the construction of the gearing actuating and actuated by the extensible shaft; Figs. 8 and 9, vertical sectional views, at right angles to each other, showing the gearing for imparting the proper feed to the saddle and tool post; Figs. 10 and 11, sectional views illustrating the construction of the tail stock and its arbor-actuating mechanism; and Fig. 12, a sectional view of a portion of the chuck.

A indicates the main frame of the machine, B the headstock and C the tail stock.

D indicates a shaft carrying the cone pulleys A′, and the small pinion A^2; and D′ indicates the back shaft carrying a large gear B′ which meshes with the pinion A^2, as shown in the plan view.

Journaled in the end of the headstock is a short shaft C′ carrying at its inner end a gear wheel C^2, and at its outer end a gear wheel C^3 which engages and receives motion from the large gear B′. Below the shaft C′ is a shaft D^2 journaled in suitable bearings in the headstock, and carrying near one end a gear wheel D^3 to mesh with gear C^2, and at the opposite end a large friction wheel or disk E,—the said shaft D^2 being capable of a slight longitudinal movement through the intervention of the rocking lever E′, collar E^2, and the screw E^3. Under one end or arm of the lever E′ is a spring E^4 which tends to move the shaft toward the end of the machine, but such movement is of course limited or restricted by the screw E^3.

Extending across the machine from front to rear is a shaft F which is provided at each end with a worm F′, and at a point between the ends with a small friction wheel F^2 designed to engage the larger friction disk E. Wheel F^2 is provided with a long spline or feather F^4 having a collar F^3, so that while the wheel F^2 may be adjusted lengthwise of the shaft F, to vary the speed or rotation of the latter, it will always rotate with the shaft, which latter is grooved to receive the spline.

Extending from the front and rear faces of the main frame A are the shelves G and G′ upon which are mounted respectively the rails H and H′, said shelves being slotted as usual so as to receive the bolts which hold the rails in any desired position upon the shelves. In the plan view I have shown the rail H as extending transversely and the rail H′ as extending longitudinally of the machine. Under the present invention I provide means whereby power may be transmitted to the devices carried by these rails, regardless of their positions upon the shelves; and this part of the invention will now be described.

Under the front of each apron is a shaft I carrying at one end a worm wheel J to be engaged by the worm F′, and at the opposite end a small bevel gear *a*, the said gear meshing with a double gear *b* mounted upon a vertical shaft *c*. This shaft *c* is mounted in a frame or housing *d* secured to the front corner of the shelf G. Encircling or swiveled upon the shaft *c* is an open frame or yoke *e* in which the end of a shaft *f* is journaled, said shaft having at its inner end a bevel gear *g* to engage the double gear *b*. As shown in the plan view, this shaft *f* is made telescopic or extensible so that it may be lengthened or shortened to conform to the position of the rail upon the shelf. At the outer end of shaft *f* is another yoke or frame *h* which is swiveled upon a vertical shaft *i* mounted on the side of the rail H; said shaft *f* having a bevel gear *j* to engage a bevel gear *k* on the vertical shaft. Journaled transversely in the rail H is a short shaft *l* which has at its outer end a bevel gear *m* to engage gear *k*, and at its inner end a similar gear *n* which projects inward between two bevel gears *o* and *p* fixed upon a shaft *q* extending longitudinally of the rail, as shown in the plan view. This shaft *q* is provided outside the rail with a pinion *r* and within the rail with a grooved collar *s* which latter is adapted to receive the

end of a shifting lever t by means of which the shaft may be moved lengthwise to bring either of the gears o or p into mesh with gear n, or to bring them into a position where neither shall be in gear.

From the foregoing construction it will be seen that motion will be transmitted to the shaft l in the rail, no matter what the position of the rail upon the shelf may be,—the extensible shaft f and the swiveled yokes e and h permitting a wide range of adjustment. Journaled lengthwise in the rail, above the shaft q, is a screw or screw shaft u which carries at one end a pinion v to engage the pinion r on shaft q, and at the other end a handle y; said screw shaft engaging a nut w on the under side of the saddle K so that when the mechanism n, o, or o, p, is in gear, the saddle and attendant parts will receive a longitudinal power feed in one or the other direction. Journaled in the rail parallel with shafts u and q is a splined shaft x fashioned at one end to receive the pinion v which is upon the shaft u. When this pinion is placed upon shaft x. and the gears n, o, p, thrown out of action, the screw shaft u may be turned by hand to effect the desired feed. This shaft x passes through a bevel gear z, (held by a lug e' on the saddle) which meshes with a similar gear a' carried at the lower end of an upright shaft b' journaled in the block or swing L, said shaft b' carrying at its upper end a bevel gear c' to engage an internally threaded bevel gear or gear nut d' journaled in the rotatable swing L. Passing through the gear nut d' is a screw shaft M which is mounted in the tool post N, from which it follows that when the shaft M is held against rotation by a clamping screw f', or otherwise, and the shaft x is rotated, the tool post will be given a longitudinal feed or movement. When the tool post is swung around as indicated by the dotted lines in the plan, this feed will be a cross feed or a feed at an angle to the rail or to the saddle. Shaft M which is provided with a handle, may, after being released (so as to be capable of turning) be turned or rotated within the gear nut and thereby effect the feed of the tool post by hand. In either case the bevel gear on shaft x moves upon the shaft to which it is keyed, as the saddle is moved back and forth.

While I have described but one of the rails, tool posts, saddle, and the mechanism carried thereby, it is to be understood that the other, located on the opposite shelf G' will be provided with similar mechanism for effecting proper feed of the saddle and tool post.

Mounted upon the arbor or spindle O is the pulley-holding chuck P, which comprises a circular main frame or body having on its front face clamping jaws g' of any desired construction, and also on its edge the radially moving pins or shafts h'. These pins h' are slotted lengthwise to receive each a key i' mounted in the opening in the chuck through which they project so that the said pins may move lengthwise but not rotate. Pins h' are threaded externally and pass through correspondingly threaded holes in the bevel gears or gear nuts Q journaled in the chuck body. Journaled in the body parallel with the arbor and with each other are shafts j' which carry at their outer ends bevel pinions k' to mesh with bevel gear nuts Q, and at their inner ends the pinions l' to engage the gear ring m^2 swiveled upon the body of the chuck. This permits me to securely hold and center pulleys of a large size, but should it be found that a greater range of adjustment is required, studs of a suitable length may be inserted into the outer ends of the screw pins h'.

Journaled in the main frame and extending from end to end, is a shaft R which projects outside the main frame at the head of the machine, where it is fashioned to receive either one of the two changeable gears S and T. When the larger of these gears is applied to the shaft R, it,—the said gear,—will mesh with the double gear U carried by a lever V, which latter is hung or pivoted upon the shaft D,—the said double gear receiving motion from the small pinion A^2 with which it always remains in gear. This lever V is slotted to receive a clamping bolt m' by means of which the lever is held in its adjusted positions. When it is desired to impart to the shaft R a slow motion the large gear S is applied to the shaft, and the said gear thrown into mesh with the double gear; but when it is desired to give the shaft a greater speed, wheel S is replaced by wheel T, and lever V is swung into such position that the double gear U (which remains in gear with pinion A^2) shall engage and give motion to the said gear wheel T. At the tail of the machine the shaft R is grooved longitudinally and fitted to receive a gear wheel W which is embraced by arms or brackets n', n' secured to the under side of the tail-stock standard X,—the said gear W being provided with a key or feather which prevents turning independently of the shaft, while allowing a sliding or longitudinal movement. This gear W engages a smaller gear Y secured to a shaft Z journaled in the standard X, the construction and arrangement being such that these gears shall remain in mesh during the backward and forward travel of the standard upon or relatively to the main frame. Upon the standard X is mounted the tail stock C which carries the boring arbor J' which latter is not only threaded externally but is also slotted longitudinally. Upon this arbor are mounted the two gears K' and L', one of which is provided with a threaded hub, while the other is provided with a key or feather, substantially as in Patent No. 446,448, to Henley and Shellenback. Mounted upon shaft Z so as to slide thereon but to always rotate therewith, is a gear M' which engages another gear N', which latter is carried by an arm or lever O' hung or journaled on a sleeve secured to bracket O^2 and concentric with shaft Z, so that when

the arm is brought into one position the gear N′ will engage the gear L′ and impart motion thereto, but when brought into another position the gears N′ and L′ will be disengaged. On that face of gear K′ next to the gear L′, is a series of ratchet teeth *o′* which are designed to be engaged by a pawl or spring-pressed pin *p′* carried by the gear L′, and thus cause the two gears K′ and L′ to turn or rotate the arbor without effecting any longitudinal feed of the latter. The nose of the pawl or pin is beveled so that the wheel L′ may turn backward independently of K′, the beveled nose of the pawl riding freely over the ratchet teeth. The pin or pawl is provided with a key which fits within a key-seat in the gear L′, but which, when the pin is pulled outward and given a partial turn, will hold the said pin out of engagement with the ratchet teeth.

Parallel with the boring arbor, on the front side of the tail-stock, is a shaft P′ which is provided with a hand wheel Q′, and the fast and loose gears R′ and S′, which latter have opposing friction flanges or rims *q′* and *r′*, and are adapted to engage, respectively, the gears K′ and L′ on the boring arbor. Upon the end of shaft P′, which is threaded, is placed a hand nut *s′*, by turning which in one direction the flange *q′* of wheel R′ will be caused to engage the corresponding flange *r′* of wheel S′ and thereby lock the two wheels together. The arbor J′ will be provided with a hole at its end to receive a boring bar T′, as in the Patent No. 446,448, referred to.

It is frequently desirable to hold the arbor J′ in a given position while facing off a hub or piece of work with a cutter on the bar T′, or with a star-feed cutter made fast to the bar or arbor,—the star-feed cutter being secured to the arbor for heavy work, and to the bar for light work. When, therefore, the pin *p′* is projected so as to engage the wheel K′, and motion is imparted to wheel L′, through gears M′, N′, &c., the wheels K′ and L′ will turn together with the arbor J′ until the hub is faced, or one or more cuts made. When the gear nut K′ turns to feed the arbor forward, the teeth on the said gear ride under and past the spring-pressed pin *p′*, and by proportioning the number of ratchet teeth to the pitch of the thread on the arbor, the distance the arbor is fed can be determined by noticing the number of clicks made by the passing of the teeth beneath the pin. This gear nut K′ may be turned by hand, through shaft P′ having hand wheel *s′* and fast gear R′,—that is, when there is no frictional contact between the gears R′ and S′—to effect a longitudinal feed of the arbor. The tail stock C is moved upon its standard X by means of a pinion *u′* engaging a rack *v′* secured to the standard,—said pinion having its shaft *w′* journaled in the tail stock and projecting through the side of the tail stock. The standard is moved upon the main frame by similar pinion U′ engaging a rack V′.

It is a matter of the utmost importance in a machine of this character to have the boring arbor and main spindle in perfect line, and to insure this result, I provide means for securing a cross-line or front to rear adjustment of the head-stock relatively to the main frame. On the under face of the head stock I form lugs *x′*, *x′*, one of which is threaded, and through these lugs I pass a shaft W′ which is threaded where it passes through the threaded lug, and which bears at opposite ends against the inner faces of the main frame, so that by turning this screw shaft the headstock may be moved or adjusted as required. This construction may be reversed; that is, the lugs may be formed on the main frame, and the screw or screws arranged to be carried by the headstock.

In order to adjust the main spindle or arbor boxes to compensate for wear, the lower faces of the boxes are beveled toward the center, and are supported upon wedge blocks *y′*, *y′*, which are internally threaded to receive the adjusting screw *z′*, provided with right and left threads. By turning the screw in one direction the wedges will approach and raise the box, but by turning the screw in the opposite direction, the wedges will be separated and allow the box to fall. The front boxes wear down most, because of the greater weight they have to sustain, but under my construction the boxes may be independently adjusted to compensate for this inequality.

Having thus described my invention, what I claim is—

1. In a pulley lathe, the combination with the main frame and the headstock; of the arbor or spindle; boxes or bearings supporting opposite ends of the arbor, said boxes being beveled toward the axis of the shaft, on their under side; wedge-nuts supporting the respective boxes or bearings; and independent right-and-left screws journaled in the headstock and engaging the wedge nuts, whereby the arbor may be adjusted in a vertical plane, at each end independently.

2. In a pulley lathe, the combination with the main frame; of the headstock mounted thereon and provided with two lugs, one of which is threaded; and a shaft threaded to engage one of the lugs and bearing at its ends against the main frame.

3. In a pulley lathe, the combination with the tail stock and the rotatable tool-arbor journaled therein; of a shaft, and intermediate mechanism for imparting motion to the arbor; and a changeable speed gear, interposed between the shaft and its driving mechanism.

4. In a pulley lathe, the combination with the tail stock and the boring arbor mounted therein; of a shaft and intermediate connections for imparting motion to the arbor; and the gear wheels K′ and L′ forming elements of such intermediate connections, and provided with the pawl and ratchet connection *o′ p′*.

5. In a pulley lathe, the combination with the tail stock and the arbor mounted therein; of the gear nut K′ and gear L′ for imparting motion to the arbor; the back shaft P′ provided with fast and loose gears R′, S′, to engage the wheels K′ and L′; devices independent of the fast and loose gears for imparting motion to the gears K′ and L′; and means for connecting and disconnecting the gears R′ and S′.

6. In a pulley lathe, the combination with the main frame and the shaft R journaled therein; of the tail stock standard; the tail stock and its arbor; a shaft journaled in the standard and provided with a gear to engage a gear having a sliding connection with the shaft R; a gear mounted upon the standard's shaft and having a sliding connection therewith; and intermediate connections between said gear and the arbor.

7. In a pulley lathe, the combination with the arbor, of the chuck mounted thereon, said chuck comprising a body encircled by a gear ring *m′;* a series of shafts *j′* provided at one end with a pinion *l′* and at the opposite end with a bevel gear *k′;* the bevel gear nuts Q mounted in the chuck frame; and screws *h′* mounted in the nuts and adapted to be projected beyond the periphery of the chuck body.

8. In a pulley lathe, the combination with the shaft D^2 and its friction disk; of the shaft F and its friction wheel F^2; means for imparting motion to the shaft D^2; the rocking lever E′ engaging shaft D^2 to move it lengthwise; a spring E^4 acting upon one arm of the lever E′; and a screw E^3 acting upon the other arm in opposition to the spring.

9. In a pulley lathe, the combination with the main frame having the stationary shelf or bracket G; of a rail H adjustably mounted thereon and adapted to be rigidly affixed in position; a tool-carrying mechanism adjustably mounted upon the rail; suitable work-holding devices; a main driving shaft D; and intermediate flexible connections for actuating the tool-carrying mechanism,—said tool-carrying mechanism being capable of independent or conjoint action, at will, with the work holder.

10. In a pulley lathe, the combination with the main frame having the shelf or bracket G; of a shaft I along the front edge of the shelf; means for imparting motion to the shaft; a rail H mounted upon the shelf and adapted to be secured thereto in different positions; tool-supporting devices adjustable upon the rail; and an extensible shaft *f* and suitable connecting mechanism for imparting motion from the shaft I to the tool-supporting devices.

11. In combination with the rail H and the sliding shaft *q* therein; a shaft *l* at an angle to shaft *q* and provided with a gear *n* adapted to engage either of the gears *o* or *p* upon the shaft *q;* a pinion *r* on the shaft *q;* a screw shaft *u* also journaled in the rail and provided with a pinion *v* to engage the pinion *r;* and a saddle having a threaded lug or nut *w* to receive the screw shaft.

12. In combination with the rail, the saddle, the block or swing, and the tool post; the shaft *q*, provided with a gear *r*, and adapted to be actuated by power; a screw shaft *u* engaging a nut on the saddle and provided with a removable gear *v* to mesh with gear *r;* a shaft *x* having its end fashioned to receive the gear *v*, and intermediate connections between the shaft *x* and the tool post; whereby the power feed may be transmitted to the saddle or to the tool post at will.

13. In combination with the rail, saddle, and tool post, a gear nut *d′* journaled in the saddle, a power mechanism for rotating the nut, means for throwing said mechanism into and out of action; a screw shaft M swiveled in the tool post; and clamping devices for the screw; whereby the tool post may be adjusted by hand or by power as desired.

14. In a pulley lathe, the combination with the main frame having the horizontal shelves G G′ on opposite sides thereof; of a shaft I along the front edge of each shelf; means for imparting motion to these shafts; independently adjustable rails H H′ mounted upon the shelves and adapted to be secured thereto; tool-supporting devices adjustable upon each of the rails; and an extensible shaft *f* and suitable connecting mechanism for imparting motion from the shaft I to the tool-supporting devices.

In witness whereof I hereunto set my hand in the presence of two witnesses.

MICAJAH C. HENLEY.

Witnesses:
W. T. DENNIS,
WEBSTER PARRY.