(No Model.) 3 Sheets—Sheet 1.

A. STREIT.

PULLEY LATHE.

No. 493,738. Patented Mar. 21, 1893.

FIG. 1.

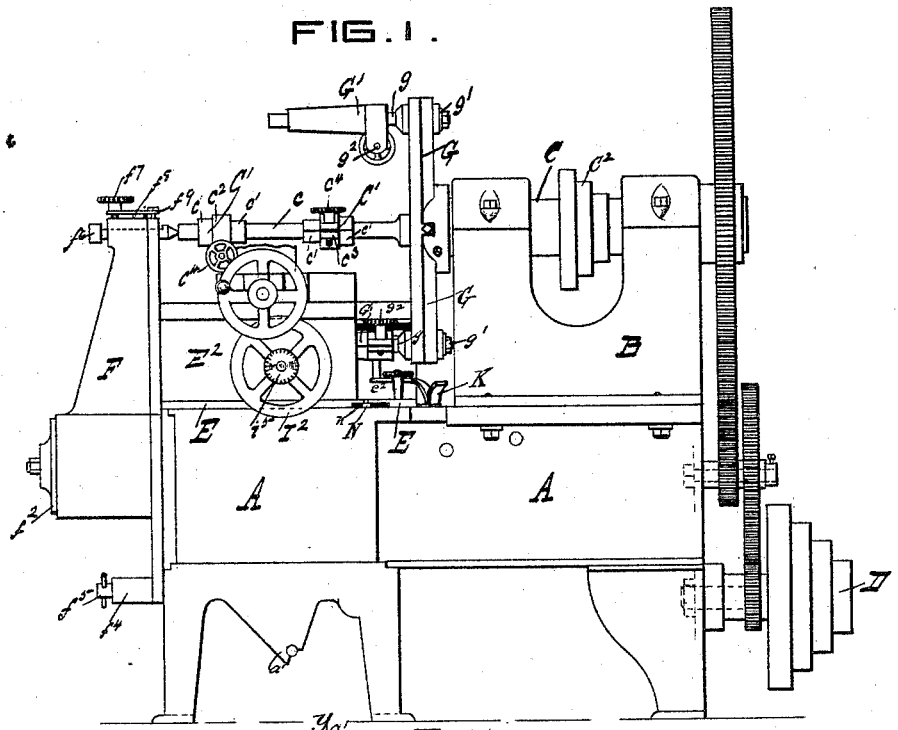

FIG. 2.

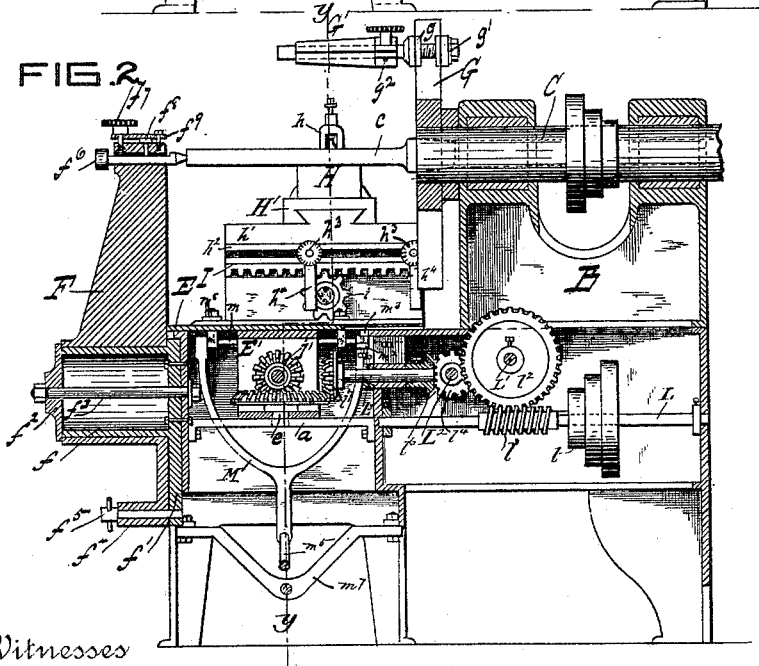

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FIG. 3.

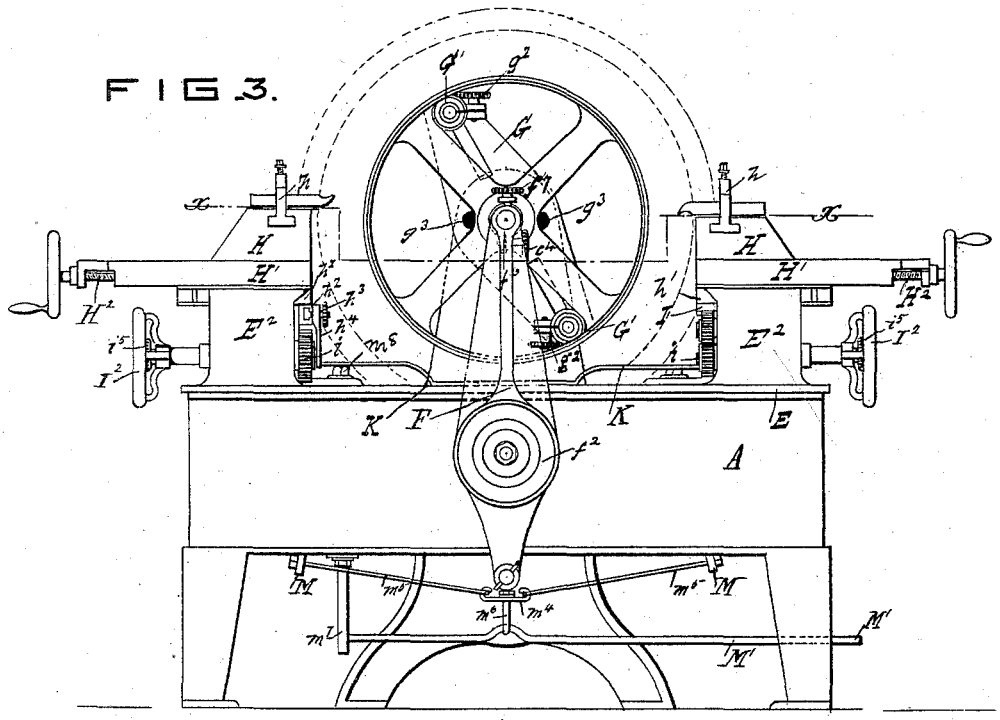

FIG. 10.

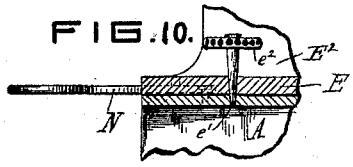

FIG. 4.

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Fig. II.

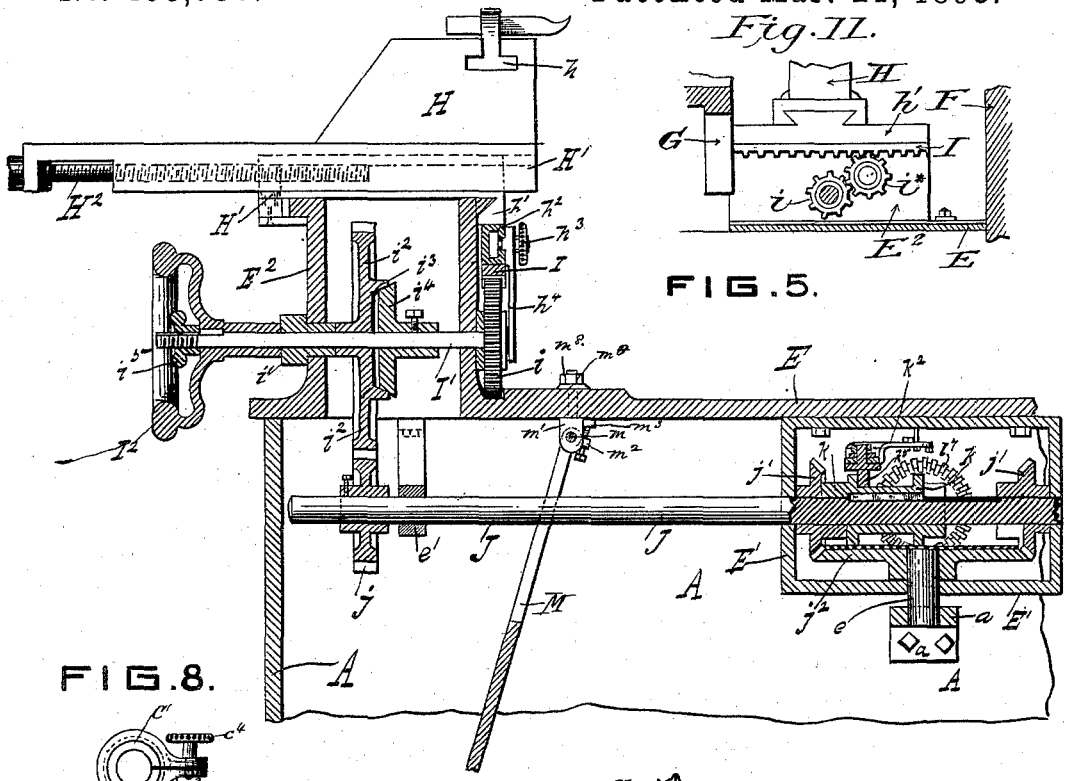


FIG. 5.

FIG. 8.

FIG. 6.

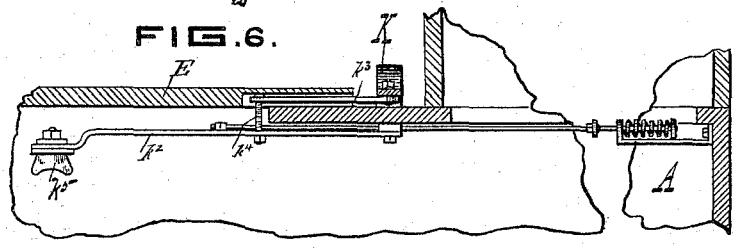


FIG. 7.

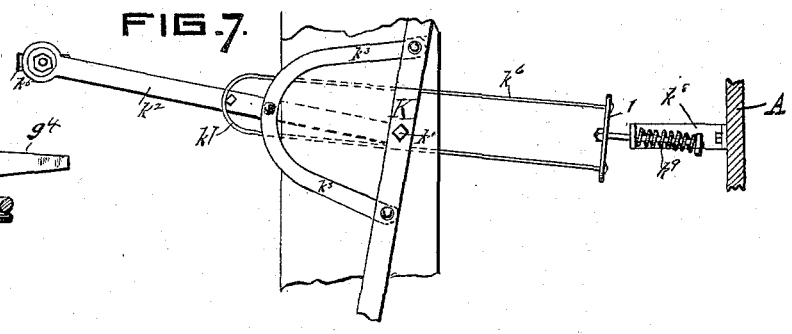
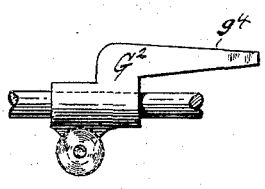


FIG. 9.



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UNITED STATES PATENT OFFICE.

ANTON STREIT, OF CINCINNATI, OHIO.

PULLEY-LATHE.

SPECIFICATION forming part of Letters Patent No. 493,738, dated March 21, 1893.

Application filed March 11, 1892. Serial No. 424,507. (No model.)

To all whom it may concern:

Be it known that I, ANTON STREIT, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Pulley-Lathes, of which the following is a specification.

The object of my invention is a lathe for rapidly and accurately dressing the face of pulleys quickly and truly centering the pulleys to be dressed, and removing them when finished, whereby the faces of the pulleys whether straight or crowned may be uniformly dressed to a true standard by even unskilled employés. These objects I attain by the means illustrated in the accompanying drawings, in connection with which the invention will be first fully described, and then particularly referred to and pointed out in the claims.

Referring to the drawings in which like parts are indicated by similar reference letters wherever they occur through out the various views: Figure 1 is a side elevation of a machine embodying my improvements. Fig. 2 is a central vertical sectional view of the same. Fig. 3 is a front elevation. Fig. 4 is horizontal transverse sectional view taken in the irregular dotted line *x*, *x*, of Fig. 3, with the parts supported above the section line removed and parts broken away to expose the mechanism which would otherwise be partially concealed. Fig. 5. is an enlarged detail view in vertical section of the device taken through irregular line *y*, *y*, Fig. 2. Fig. 6. is an enlarged detail view in vertical section of the tool reversing device taken through line *z*, *z*, Fig. 4. Fig. 7. is a plan view of the same. Figs. 8, 9, and 10 are separate detail views of some of the parts. Fig. 11 is a detail view of part of the tool feeding devices.

Referring to the parts by reference letter: A, is the base or supporting stand of the machine. It is a strong cast iron structure and may be of any suitable form.

B, is the head stock firmly secured upon the frame. In this is mounted the customary live spindle C, driven by a belt from any source of power passing over the cone pulley D, and the customary gearing to connect the pulley shaft and spindle.

The flanged upper end of the stand A, is dressed off true and upon it rests the table E. To the under side of the table is secured a box E′, the bottom of which is centrally perforated to receive the vertical shaft *e*, which is secured in the bridge *a*, the angle ends of which are secured to the sides of frame A. The shaft *e*, is the pivot around which the table E. turns to adjust the angle of the cutters, and it also serves as the journal for the lower bevel gear of the tool feed. The forward end of the spindle C, is bored tapering to receive the taper shank of the mandrel *c*, upon which the pulley is centered for turning.

The swinging tail stock F, is journaled upon a hollow hub or stud *f*, which is cast integral with a plate *f′*, which plate is bolted securely to the side of the supporting frame of the stand A. The tail stock is held in place by a cap f^2, which is held against the end of the hub by a bolt f^3. The tail stock has a downward extension terminating in a perforated boss f^4, adapted to receive a removable pin f^5, which passes through the boss and into the plate *f′*, to hold the tail stock in a vertical position. In the upper end of the tail stock is fitted to slide the centering pin f^6, the shaft or this centering pin is flattened or longitudinally grooved to seat the points of the set pins f^7, f^8. The set pin f^7, is screw threaded and passes freely through a spring f^9, and through a screw threaded hole in the top of the tailstock. By screwing down the set pin f^7, both pins f^7, and f^8, are firmly pressed upon the centering pin f^6, and holds it firmly in the position to center and support the mandrel, *c*, as clearly shown in Figs. 1 and 2, by loosening the screw f^7, the pin f^6, is released and may be pulled back; its complete retraction from the tail stock is prevented by the pin f^8. When the pin f^6, is drawn back and the pin f^5, drawn out of the hole in the plate *f′*, the tailstock may be turned down to admit of the removal of a finished pulley, and the replacement of one to be dressed.

To provide for dressing pulleys of different bores upon the same mandrel, I provide movable bearings C′, (Fig. 8.) These are made in pairs and each pair is adapted to center two different sized pulleys. I will describe one of these bearing sleeves and as all are alike except in the size of the necks which enter the pulley bore, the description of one will answer for all.

The sleeve C′, is bored centrally to snugly fit over the mandrel *c*, each end is turned off truly to form necks *c′*, of different diameters leaving a raised collar c^2, from which projects an arm c^3. The sleeve so formed is radially slotted centrally through the arm c^3, through the collar c^2, and the necks *c′*, clamping hand screws c^4, pass freely through one of the arms c^3, and is screw threaded into the opposite one to force the arms together and firmly clamp the centering sleeves C′, upon the mandrel *c*. The necks *c′*, of the sleeves accurately fit the bore in the pulley hub. When a particular size of pulley is to be dressed the inner sleeve C′, is first fixed upon the mandrel, the pulley placed upon it, then the outer sleeve is placed and clamped in position and the tail turned up and secured in place.

The face plate G, which is secured upon the end of the spindle C, is radially slotted from its outer ends to near the hub. The studs *g*, are radially adjustable in these slots by means of cap nuts *g′*, upon the screw thread ends of the studs G′ are cone shaped sleeves slotted longitudinally and provided with clamping screws g^2, in their lugs by which the sleeves are adjusted and firmly clamped upon the studs. After the pulley is fixed upon the mandrels the sleeves are set in to bear against the side of the arm near the rim of the pulley as seen in Fig. 3, and set screws g^2, tightened up. By means of these tapering sleeves or drivers the pulley is firmly held to revolve with the spindle and when once set up for a particular size pulley need not be adjusted thereafter, until all pulleys of that size have been dressed. When turning very large pulleys the driver sleeves may be adjusted between the arms at the hub.

Pulleys are now generally made with four arms and the face plate G, as shown in the general views is adapted for such pulleys, but I have also provided for dressing pulleys having five or six arms. This I accomplish by perforating the face plate at g^3, near the hub to receive studs (one or two as desired) and providing clamping sleeves G^2, (Fig. 9.) having a tapering horn g^4, which may swing around upon the stud to bring it nearer to or farther from the axis of rotation. This driver may like the driving sleeves G′, be adjusted longitudinally upon the stud so that by removing one or both of the outer driving sleeves and fixing the inner studs and sleeves G^2, either a five or a six arm pulley of any size may be readily mounted.

The supports E^2, for the movable tool carrier H, and their bed plates H′, are firmly secured upon or made integral with the bed plate E. The beds H′, are fitted to slide in dovetail ways upon the supports E^2, and at right angles to the length of the table and the tool carriers H, are fitted to slide parallel with the longitudinal sides of the table in ways upon the bed plates. The tool carriers are adjustable nearer to or farther from the axis of rotation by feed screws H^2, in the usual manner and the sliding T shaped tool clamp *h*, fitted to slide in the tool carrier is the same as usually employed in metal turning lathes, but the means by which the tool carrier bedplates H′, are fed back and forth either by hand or automatically and adjusted to the working position, are my invention and will now be described.

Under the overhanging inner end of the plate H′, is secured a bar h^2, which has a longitudinal undercut groove to receive sliding blocks which receive set screws h^3, these set screws pass through the ends of stop arms h^4, for the purpose of adjusting the arms to regulate the travel of the cutters in either direction as will be hereinafter described. To the under side of this bar h^2, upon one side of the machine is secured a rack bar I, the teeth of which mesh with a pinion *i*, which pinion is secured upon the inner end of a shaft I′, which shaft extends through the tool stock E^2, and has a hand wheel I^2, upon it, the wheel is connected to the shaft by a spline which permits a slight longitudinal play of the shaft within the hub of the wheel. The outer bearing for the shaft I′, is a bushing *i′*, against which the inner end of the hand wheel abuts. It will be seen that by revolving the hand wheel in either direction the tool carriage is adjusted or fed by hand in either direction.

I will now describe the means by which the tool feed shaft I′, is coupled to or uncoupled from the power driving mechanism; and the means by which the same is reversed both by hand and automatically.

Referring particularly to the enlarged half sectional view Fig. 5, and understanding that each end of the machine in so far as the feed mechanism is concerned is constructed alike with the exception of an idler gear interposed between the rack I and its driving wheel *i*, which is necessary to insure the the movement of the tool carrier supporting plate H′, in opposite directions which feature will be described hereinafter and understanding also that the transverse center of the table E, is through the axis of the vertical shaft or stud *e*, the following description will be readily understood.

J, is a shaft journaled in the sides of the box E′, which is secured to the under side of the table E, its ends may, if necessary to insure a steadier movement be also journaled in hangers *e′*, near each end of the shaft, these hangers are secured to the underside of the table E. Upon the shaft at each end is secured pinions *j*, which mesh with gear wheels i^2, which wheels are journaled upon the shaft I′. From the inner face of the gear wheel i^2, extends a beveled clutch flange i^3, the opposite member of the clutch i^4, is secured upon the shaft I′. Upon the outer end of this shaft I′, is a screw wheel i^5, to draw the male clutch member i^4, against the female i^3, to couple the gear wheel i^2, to its shaft I′, while so coupled the tool feed shaft will of course be driven

by power through shaft J, but a slight reverse turn of the wheel i^5, uncouples it and leaves it to be controlled by the hand wheel I^2.

Upon the shaft J, within box E, are journaled two bevel gear wheels j', to mesh with the beveled gear wheel j^2, which is journaled upon the vertical stud e. The inwardly projecting hubs of both pinions j', are notched to form clutch members and upon the shaft J, between these pinions is fitted the sliding clutch member k, a spline couples the clutch to the shaft while permitting it to slide. The clutch is coupled to either of the pinions j', by the shifting lever K, shown clearly in Fig. 4. The opposite ends of this lever are above the table but the center portion has a downward bend to rest upon the frame A, to which it is fulcrumed by the bolt k', which passes through the table top and through the lever arm k^3, which is rigidly held at a right angle to the arm K, by the yoke k^3, and stay bolt k^4. To the free end of the lever arm k^2, is secured a clutch guide k^5, the curved lower edge of which fits over the clutch member k, between collars against which the block strikes and shifts the clutch from one of the clutch pinions to the other to revolve the feed shaft J, alternately in opposite directions. The shifting clutch guide k^5, has sufficient play between the collars upon the clutch to permit the lever to be brought to the center of its throw before engaging the collar to uncouple the engaged pinion.

In order that the clutch when uncoupled from one pinion will be quickly snapped into engagement with the opposite one I provide a spring pulled yoke or loop k^6, the curved end of which takes over a pin k^7, secured in the lever arm k^2, a rod secured in the connecting bar of the yoke at the opposite end passes through an upwardly projecting lug in a piece k^8, which is secured to the frame of the machine, a spring k^9, is coiled around the rod and compressed between a nut upon its end and the lug of piece k^8. It will thus be seen that as soon as the lever is thrown past the center in either direction the force of this spring will quickly throw the clutch in engagement with the opposite clutch pinion and hold it engaged until again thrown past the center in the opposite direction.

One end of the lever K, is provided with a handle, by which the lever may be operated to shift the clutch by hand, the opposite part of the lever arm is curved to bring its end between the adjustable arms h^4, so that the clutch may be automatically operated by the travel of the tool carrier, and the arms be adjusted to reverse the feed according to the width of the pulley face to be dressed when there are a number of the same kind of pulleys. If but few of one size are to be dressed one of the stops is removed but the one nearest the face plate G, should be fixed to automatically reverse the feed and prevent the tool being carried against the face plate should the operator forget to reverse the shifting lever.

Figs. 2 and 5 show the same side of the tool holding and feeding devices, but the only difference between the side shown and the opposite side, shown partly in Fig. 11, is that the stop arms h^4, and their holding bar h^2, are omitted the rack bar I, placed up against the projection h', and an idler gear wheel i, interposed to mesh with the teeth of the wheel i, and rack bar so that the tool carriers will travel in opposite directions.

The feed shaft J, is driven by a belt which passes over the cone pulley C^2, fixed on the spindle C, as follows:—The belt drives a shaft L, by passing over a cone pulley l, secured upon said shaft. Secured upon shaft L, is a worm l', which engages a worm gear l^2, secured upon a shaft L'. Upon the shaft L', is a cog gear l^3, which meshes with a pinion l^4, secured upon a shaft L^2. A bevel gear wheel l^5, is secured upon the shaft L^2, and meshes with a beveled pinion l^6, which is secured upon a shaft L^3. The shaft L^3, carries another beveled pinion l^7, which meshes with the beveled gear wheel j^2, which is journaled upon the vertical stud e, and meshes with the loose clutch pinions j', which are journaled upon shaft J.

The tool carriers always travel in parallel planes in opposite directions, and at right angles to the longitudinal center of the bed plate E, upon which they are fixed. The feed is so arranged that the cutting tool upon one side dresses on half of the pulley rim, while the opposite tool dresses the other half, both tools cutting at the same time, first from center to edge of the pulley face, then from edge to center. To dress a flat face pulley the table E, is set at a true right angle to the axis of the spindle C, and mandrel c. To dress bevel faced pulleys the table is set at an angle to the axis, and the angle at which it must be set depends upon the width of the pulley face as all standard pulleys should have the same slope from center to edge whatever the width of the face, that is the difference of diameters between the pulleys at center and edges is the same in a narrow faced pully as in a wide faced one, to wit, one-eighth of an inch. To set and lock the table E, to the desired position and hold it firmly upon the frame A, I employ first a system of levers to lock and release the table and a removable pin and registering holes in the table and flange of the frame to determine the desired angle.

M, M, are bifurcated angle levers fulcrumed upon shafts m which pass through lugs or hangers m', the shanks of which pass through the table E, and have nuts m^3, upon their upper ends to secure them in place. The angles m^2, of the levers are provided at their ends with set screws the points of which bear against lugs m^3, which project inwardly from the sides of the frame A, as seen in Fig. 5. Now it will be seen that when the lower ends

of the levers are drawn together the table E, will be drawn down tightly upon the top edge of the frame. The lower ends of the levers are connected to a central plate m^4, which has hooked ends by bars m^5, through the center of the plate m^4, passes an eye bolt m^6,. A lever arm M′, passes through the eye of the bolt its inner end is fulcrumed in a hanger m^7, and its outer end extends outside of the frame, when the lever M′, is pressed down to clamp the table upon the frame its outer end is swung into a notch a', in the base of the frame A, (see Fig. 1.) to hold it in the locked position.

One corner of the table (see Figs. 4 and 10) is perforated with a series of holes e', to receive a taper pin e^2, which has a knurled head. The top of the frame corner is also perforated, to register with one or the other of the holes on the top E, as its position is changed so that when the pin e^2, is passed through the top and into the hole in the frame A, its adjustment cannot be changed, until the pin is removed.

To secure the proper adjustment of the table I first lock it in the central position upon the frame or its upper flange. I then ream this hole out to the same taper as the taper steady pin e^2, when the pin is forced to its seat, it brings the table truly to its central position for dressing straight faced pulleys. I then change the position of the table to that which it should occupy when the widest faced pulley is to be dressed and fix it in position. I then in the same manner drill another taper hole through table and frame for the reception of the pin e^2, and so on until holes have been drilled and reamed out for the reception of pin e^2, to set and fix the table for pulleys of each and every sized face. The under side of the table is recessed to pass a lever N, the inner end of which is fulcrumed upon the frame top, a pin projects up from the upper side of the lever into a slot in the table, by means of this lever the table is turned upon the frame until the desired holes in the table and frame register when the pin is pressed through them, bringing the table in position.

The operation of the device is as follows:— If straight faced pulleys are to be dressed the table is set to its central position as seen in the drawings particularly Fig. 4. The tail stock F, being thrown down and the mandrel c, in position with the inner sleeve C′, clamped upon it in the proper position, a pulley is placed over the mandrel and the neck of the inner fixed sleeve C′. The outer sleeve C′, is then pushed to place the neck within the bore of the hub and its sleeve against the hub end, and the screw c^4, tightened up; the tail stock is now thrown to the vertical position and the centering pin f^6, fixed in position as seen in Fig. 1. The cone sleeves G′, are then set to tightly fix the pulley as seen in Fig. 3. The cutting tools being out of working position and the power feed being disconnected by loosening the screw wheel i^5, to uncouple the clutch, i^3, i^4. The under cutting tool upon the right hand side (see Fig. 3) is then fed to take a slight cut exactly in the center of the pulley face; after it has made a cut around the pulley the opposite or upper cut tool is adjusted up to the central part of the part, so dressed. The arms h^4, are now set to the proper position, and the wheels i^2, and i^4 tightened up to couple the power driving feed; the cutters will now travel in opposite directions toward the edges of the pulley; after they have passed the edges, the cutters are fed forward for another bite, and when one of the arms i^4, strikes the end of the lever K, and carries the arm k^2, past the center of the clutch k, the clutch is shifted to the opposite pinion, and the feed reversed; the cutters then travel from edge to center until the feed is again reversed by the opposite arm i^4, acting upon the end of the lever arm K. To dress taper or crown faced pulleys, the table is set by the taper pin at less than the angle required; that is, if the pulley to be dressed has a six inch face, the pin is first placed in the holes which set it for an eight inch face pulley. The cutters are then adjusted as described for a straight faced pulley and the machine started. When the cutters have traveled beyond the edges of the pulley, the operator throws lever M′, out of the notch by his foot, withdraws the pin e^2, changes the table to the hole which sets it for the six or seven inch face pulley; depending upon whether it is necessary to take two or three cuts to bring the pulley face to the proper taper; (the forcing in of the pin brings the table to the exact position.) The lever M′, is then thrown down and into its notch a'; this can all be done before the cutters on their reverse movement have again reached the edges of the pulley, and without stopping the machine. It will thus be seen that once the tool carriage is set to bring the cutters to their cutting position by the screws H^2, their position need not be changed, as the changes of the table to a greater angle feeds both cutters exactly the same distance inward to take a new bite, by this means both sides of the cutters are used and a different part of their edges presented to the work each time the table is changed they thus require less sharpening.

In the pulley lathes now in common use the tool carriers are each separately set to the desired angle in the first place, the tools set to working position, and a cut taken upon each side from center to edge; the bite of the cut being much deeper near the edge than at the center, the weak edges spring inward, which springing back again, so soon as the cutters are removed, leave the face of the pulley upon each side of the center slightly concave, which renders it difficult to dress the face true, without leaving ridges, when the tools are fed for another bite; and it requires much more labor to polish the faces of such pulleys than those dressed upon my machine.

There are many of the features above described that may be modified and some entirely omitted, and still many of the advantages of my invention be attained, but not so quickly or surely. I have shown and described all the features which I have found by experience to be necessary in a perfect pulley lathe; many of which were invented and added to my lathe as originally constructed and successfully operated. I hence believe myself entitled to protection not only for the lathe as a whole but separately to the several groups of mechanisms which acting together or in succession attain the result perfectly and economically.

What I claim is—

1. In a pulley lathe the combination of the fixed supporting frame, a table pivoted to turn upon said frame tool stocks secured upon said table tool carriers mounted thereon and adapted to slide parallel with the longitudinal center of the table and also at a right angle thereto, and means such as shown to feed the tool carriers parallel to the pulley face to be dressed, substantially as described.

2. In a pulley lathe the combination of the stand, the pivoted tool carrying table mounted thereon the head stock secured upon the stand the live spindle and means for driving the same angle levers fulcrumed in the table and having their angle ends extending under projections from the stand whereby the table is locked firmly upon the stand when adjusted and released from the stand to allow of its adjustment, substantially as shown and described.

3. The combination substantially as described of the supporting frame carrying the head stock and movable tail stock, the table carrying the cutter supports and cutters and pivoted to turn upon said stand, the levers for locking the table and releasing it from the stand the said stand and table being perforated at e, to receive a pin and the steady pin e^2, whereby the table is adjusted and set at the desired angle substantially as shown and described.

4. The combination of the supporting stand A, the head stock B, secured thereon the live spindle the spindle driving mechanism the movable tail stock the table E, supported upon the stand, the box E, secured thereunder, the bridge a, the shaft e, secured in said bridge and passing through the box E′, to pivot the table and the levers to lock the table to or release it from the stand substantially as shown and described.

5. The combination in a pulley lathe of the supporting stand the head stock secured thereon, the table E, pivoted to turn upon the stand the tool carriers secured thereon the table and stand being perforated at e', and the tapered steady pin e^2, to fix the adjustment of the table upon the stand substantially as shown and described.

6. The combination, in a lathe for turning pulleys, of the fixed stand and headstock, the hollow spindle and mandrel c, carried thereby, the tail stock F pivoted upon the fixed stand, the centering pin fitted to slide in the plane of the axis of the mandrel, means, such as shown, to release and fix the said centering pin, and means to hold the said tail stock rigidly in its working position, and to release it, for the purpose of quickly placing a pulley on the mandrel, c, or removing it therefrom, substantially as shown and described.

7. The combination of the stand A, the head stock and tail stock supported thereon the table E, pivoted upon the stand the tool stocks E^2, secured upon the table the tool carriages mounted to slide upon the stocks E^2, the racks I, secured to the tool carriage the shaft I′, the pinion i and hand wheel I^2, to revolve the shaft and pinion to move the tool carriage by hand substantially as shown and described.

8. The combination of the stand the head and tail stock mounted thereon the pivoted table E, the tool stocks mounted thereon the box E′, secured to the underside of the table the feed shaft mounted therein the clutch pinions j', j', loose upon the shaft J, the sliding clutch member j, splined upon said shaft between the clutch pinions the pin e, pivoting the table and extending through the bottom of the box E′, the beveled wheel journaled upon said pivot e and meshing with the beveled clutch pinions the gear wheels j, secured upon the opposite ends of the shaft J, to mesh with the driving gear of the tool carriages, a shifting lever to throw the clutch from one clutch pinion to the other to reverse the tool feed and driving mechanism for revolving the beveled wheel j^2, to actuate the tool feed substantially as shown and described.

9. The combination substantially as hereinbefore set forth, of the stand A, the pulley supporting and driving mechanism mounted therein the table E, the tool carriages their supports and feeding devices upon the table, the tool feed shaft, supported from the underside of the table the beveled pinions j', j', loose upon said shaft between the pinions, the pinions j, connecting the shaft and tool feed mechanism the pin e, secured in bridge a, and extending through the tool-feed-shaft support the loose beveled gear wheel upon said pin and meshing with the loose pinions j', and the beveled gear wheel l', and intermediate gears mounted in frame A, and the belt connecting it to the pulley driving spindle whereby the feed mechanism supported under the table is revolved in either direction at whatever angle the table may be set.

10. The combination in a pulley lathe of the stand A, the feed driving mechanism mounted therein the table E, resting upon the frame and pivoted therein, the tool stocks E^2, secured upon each end of the frame the tool carriages H′, fitted to slide upon said stocks E^2, the rack secured to the tool carriages the shafts I journaled in the stocks E^2, the gear wheels i, secured upon said shafts and meshing with the teeth of the racks, the

box E′, secured to the underside of the table the feed shaft J, journaled in the sides of said box the pinions j, secured upon the ends of said shaft the cog wheel i^2, loose upon shaft I′, and having clutch flange i^3, upon the inner side the male clutch disk i^4, secured upon the shaft I, the hand wheel I^2, splined upon said shaft the wheel i^5, screwed upon the outer end of shaft I′, to couple the cog wheel i^2, to the shaft I′, or uncouple it therefrom and mechanism to revolve the shaft J, alternately in opposite directions whereby the tool carriages may be coupled to the shaft J, and driven by power or uncoupled and operated by hand substantially as shown and described.

11. In a pulley lathe the combination of the tool carriages H′, the rack I, secured thereto the hand wheel shaft I′, pinion i, secured thereon to mesh with the rack and wheel i^2, loose upon said shaft and having the clutch flange i^4, the hand wheel I^2, splined upon said shaft and the screw wheel i^5, on the end of the shaft I′, for the purpose of connecting and disconnecting the clutch members i^3, i^4, substantially as shown and described.

12. In a pulley lathe the combination of the sliding tool carriages the feed shaft J, and gearing for connecting the feed shaft and tool carriages the clutch for alternately revolving said shaft in opposite directions with the shifting lever for the sliding clutch member consisting of the pivoted lever arm K, the arm k^2, secured at right angles thereto and carrying the clutch guide k^5, and the spring pulled yoke k^6 secured to the frame of the machine at one end and passing around a pin in the arm k^2, for the purpose of quickly snapping the sliding clutch member into engagement with the opposite clutch members after the lever K, has passed the center substantially as shown and described.

13. In a pulley lathe the combination of the live spindle the pulley supporting mandrel the pulley centering sleeves C′, having centering necks c', central collars c^2, arms c^3, and radially slotted through said arms necks and collars upon one side and the screws c^4, to clamp the collars upon the mandrel substantially as shown and described.

14. The combination of the face plate G, slotted from the ends to near the hubs the studs g, adjustable in said slots the cone sleeves G′, bored to fit said studs and longitudinally slotted through to the bore and clamping screw g^3, to clamp said sleeves upon the studs substantially as shown and described.

15. The combination of the face plate slotted and perforated near the hub the removable studs adjustable in said slots the cone sleeves adjustable upon said studs, studs for the perforations in said face plate, adjustable sleeves for said studs having cone horns adjustable around the studs substantially as and for the purpose set forth.

16. The combination of the driving stud cone sleeves centrally perforated to fit said studs having radially extending lug or arms and slotted to secure the arms and cone sleeve to the central bore and clamping screws to adjust and fasten the sleeves upon the studs.

ANTON STREIT.

Witnesses:
GEO. J. MURRAY,
FRANK S. DAVIS.