(No Model.) 3 Sheets—Sheet 1.

# D. T. MATTHEW & A. T. COLLIER.

## WOOD TURNING LATHE.

No. 534,119. Patented Feb. 12, 1895.

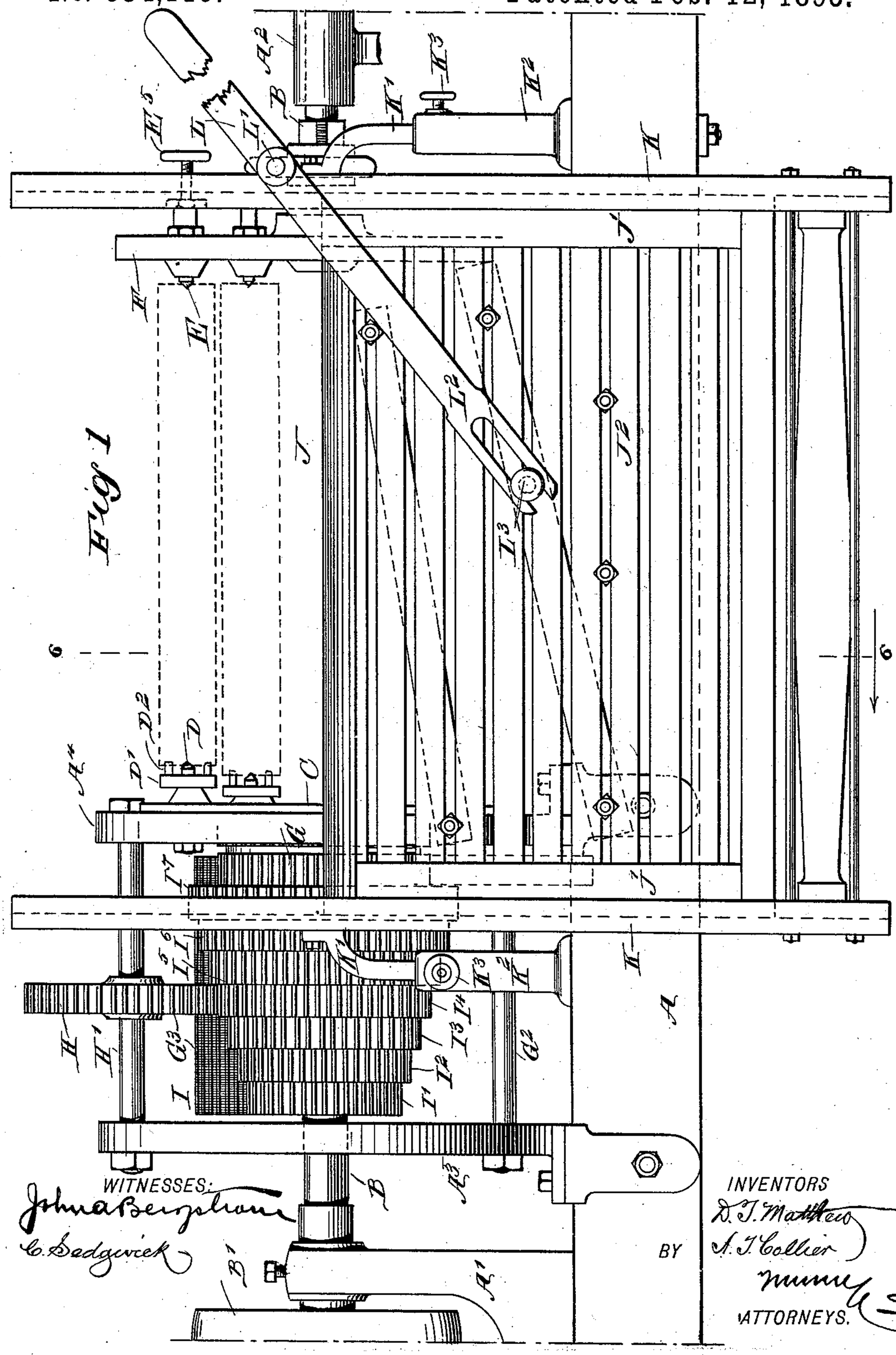


Fig. 1.

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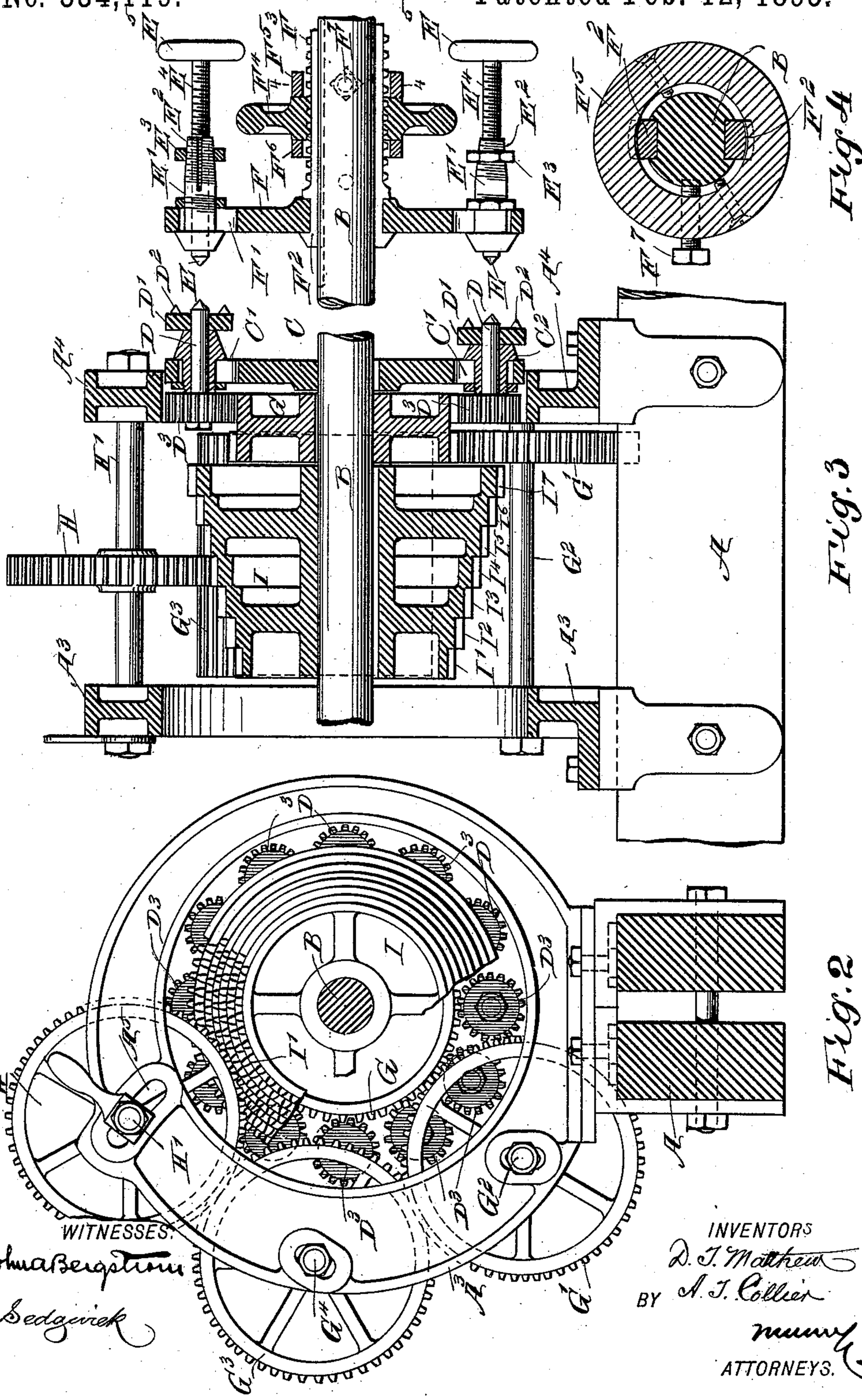

Fig. 4

Fig. 3

Fig. 2

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(No Model.) 3 Sheets—Sheet 3.

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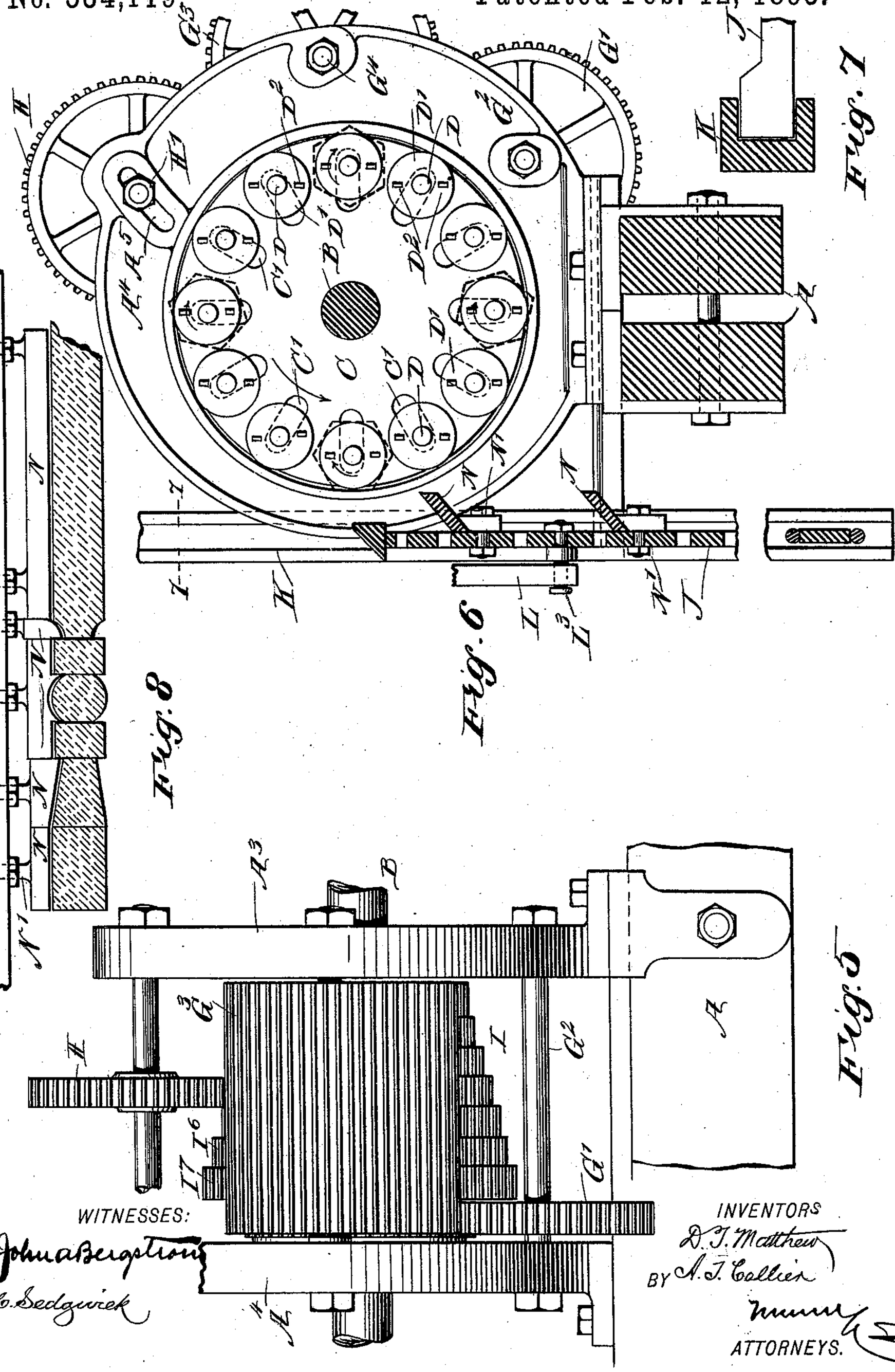

Fig. 7

Fig. 6

Fig. 8

Fig. 5

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# UNITED STATES PATENT OFFICE.

DAVID T. MATTHEW AND ALBERT T. COLLIER, OF TACOMA, WASHINGTON.

## WOOD-TURNING LATHE.

SPECIFICATION forming part of Letters Patent No. 534,119, dated February 12, 1895.

Application filed March 1, 1894. Serial No. 501,977. (No model.)

*To all whom it may concern:*

Be it known that we, DAVID T. MATTHEW and ALBERT T. COLLIER, both of Tacoma, in the county of Pierce and State of Washington, have invented a new and Improved Wood-Turning Lathe, of which the following is a full, clear, and exact description.

The invention relates to multi-spindle lathes for turning polygonal forms.

The object of the invention is to provide a new and improved wood turning lathe, which is comparatively simple and durable in construction, very effective in operation and arranged to automatically and accurately turn a series of posts or sticks at a time, and with polygonal forms.

The invention consists principally of a revoluble head provided with revoluble spindles to engage one end of a series of objects to be turned, and a movable knife frame carrying knives adapted to cut on the outermost surfaces of the objects as the same are carried by the knives.

The invention also consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a sectional end elevation of the same with parts broken out. Fig. 3 is a longitudinal section of the head and tail stocks. Fig. 4 is an enlarged transverse section of part of the improvement on the line 4—4 of Fig. 3. Fig. 5 is a rear side elevation of the head stock. Fig. 6 is a transverse section of the improvement on the line 6—6 of Fig. 1. Fig. 7 is a sectional plan view of the knife guideway on the line 7—7 of Fig. 6; and Fig. 8 is a plan view of the knife frame carrying the knives in engagement with a post to be cut.

The improved lathe is provided with the usual bed A, carrying bearings A′ and A², in which is journaled the longitudinally-extending main shaft B, provided at one outer end with a pulley B′ connected with other machinery for imparting a rotary motion to the said shaft B. On the latter is fastened the circular head C formed with radial slots C′ in each of which extends a bearing C² held radially adjustable in the slot and adapted to be fastened to the opposite sides of the head C in any suitable manner.

In each bearing C² is journaled a live spindle D, carrying at its forward end, a disk D′ having points or projections D² adapted to engage the end of the stick or post to be turned, so that when the spindles are rotated, the said sticks or posts rotate with the spindles. Opposite the live spindles D are arranged the usual dead spindles E, each in alignment with its corresponding live spindle, and fitted in a sleeve E′, held adjustably in a radial slot F′ formed in the tail head F, as plainly shown in the drawings. The rear end of each dead spindle E screws in the threaded tapering part E² of the sleeve E′, and in order to securely fasten the dead spindle in place after it is adjusted, the said threaded end of the sleeve is split and also exteriorly threaded and on this thread screws a nut E³ to securely clamp the threaded end E⁴ of the dead spindle E in place.

On the extreme outer end of each dead spindle E is arranged a hand wheel E⁵ for conveniently screwing the spindle up when the nut E³ is unscrewed to adjust the front pointed end of the spindle so as to readily engage the right hand end of the post or stick to be turned.

The tail head F is loosely keyed on keys F² fitted to slide longitudinally in suitable grooves or keyways formed in the main shaft B, the said keys F² being arranged diametrically opposite each other, and each is formed with rack teeth F³ adapted to be engaged by an interior worm wheel thread on a hand wheel F⁴ mounted to rotate between two collars F⁵ and F⁶ secured by a set screw F⁷ to the shaft B. The tail head F only rotates when the shaft B rotates, thus keeping the head and tail chucks always in alignment one with the other.

Now, it will be seen that by turning the hand wheel F⁴, the keys F² can be moved longitudinally, so as to move the pointed ends of the dead spindles E in or out of engagement with the posts or sticks to be turned. On the rear ends of the live spindles D are secured the pinions D³ in mesh with a gear wheel G

mounted to rotate loosely on the main driving shaft B directly in the rear of the head C. This gear wheel G has a face sufficiently wide for engagement with a gear wheel G′ besides the pinions $D^3$, as plainly shown in Fig. 3, this gear wheel G′ being mounted to rotate loosely on a shaft $G^2$ secured in the frames $A^3$ and $A^4$ bolted on the bed A and forming part of the head stock, as will be readily understood by reference to the drawings. This gear wheel G′ is in mesh at all times with a gear wheel $G^3$ mounted to rotate loosely on a shaft or rod $G^4$ secured in the said frames $A^3$ and $A^4$. This gear wheel $G^3$ has a face of such length as to extend throughout the distance between the frames $A^3$ and $A^4$, and in this gear wheel $G^3$ meshes a gear wheel H held longitudinally-adjustable on a rod H′ held adjustably in segmental slots $A^5$ formed in the frames $A^3$ and $A^4$. The centers for the segmental slots $A^5$ are in the center of the rod $G^4$ so that whenever the rod H′ is shifted in its slots $A^5$ in the frames $A^3$, $A^4$, then the gear wheel H will at all times be in mesh with the gear wheel $G^3$. The gear wheel H is adapted to be thrown in mesh with one of the gear wheels of a cone gear wheel I having the gear wheels I′, $I^2$, $I^3$, $I^4$, $I^5$, $I^6$, $I^7$, of gradually increasing diameter and arranged alongside each other in the usual step form and all keyed to the main shaft B, as plainly shown in Figs. 1, 3 and 5, the purpose of the gear wheels G G′ $G^3$ and H, being to convey the motion of any one of the cone gears I′, $I^2$, $I^3$, $I^4$, $I^5$, $I^6$, $I^7$ to all of the pinions of the chuck spindles.

Now when the machine is in operation and the sticks or posts are fastened on their corresponding sets of spindles D, E, and a rotary motion is given to the shaft B, then the said posts are turned on each revolution of the head C a distance corresponding to the polygonal form intended to be given the post—that is to say, when the gear wheel H is in mesh with the gear wheel $I^4$ of the cone gear wheel I, as shown in the drawings, then each post or stick is given one-sixth of a revolution for each full revolution of the shaft B, so that hexagonal posts or sticks are produced by the knives N, cutting on six sides of each post. In a like manner, when the gear wheel is in mesh with the smallest gear wheel I′ of the cone gear wheel I, then a twenty four sided polygonal form is given to each post, that is to say, practically a round post is produced. In a like manner when the gear wheel H is in mesh with the gear wheel $I^3$, then an octagonal figure or form will be given to the post, and when the said gear wheel H is in mesh with the gear wheel $I^5$, then a square form will be given to the post, and three sides are given to the posts or sticks when the gear wheel H is in mesh with the gear wheel $I^6$. Only two sides are turned or cut on each post or stick, when the gear wheel H is in mesh with the largest gear wheel $I^7$.

Now, it will be seen that in order to mesh the gear wheel H say into the smallest diameter gear wheel I′, the rod H′ carrying the said gear wheel has to be moved inwardly in its slots $A^5$, the said gear wheel H being also shifted to the left hand end of the shaft H′, so as to properly mesh into the gear wheel I′. In a like manner the shaft H′ has to be shifted outwardly in case the said gear wheel H is to mesh into one of the other gear wheels of the cone gear wheel I, it being also understood that the said gear wheel H is shifted longitudinally on its shaft to properly mesh into the desired gear wheel.

A knife frame J is arranged on the front of the lathe between the heads C and F, and this frame J is provided with side bars J′ fitted to slide vertically in suitable guideways K supported on rods K′ held vertically-adjustable in keepers $K^2$ secured on the bed A of the lathe. The rods K′ can be fastened in place in the said keepers by set screws $K^3$, as plainly shown in Fig. 1.

In order to move the frame J up and down in its guideways K, a lever L is provided, pivoted at L′ to one of the guideways K and under the control of the operator. The lower or inner slotted end $L^2$ of the said lever L is adapted to engage a bolt $L^3$ held on the said frame J so that when the operator presses on the free or handle end of the said lever L he can impart an upward sliding motion to the said frame J, so as to bring the knives N carried by the frame, in contact with the outer faces or surfaces of the sticks or posts supported on the spindles D and E.

The frame J is preferably provided with a series of longitudinally-extending slats $J^2$ connected with the side bars J′ and between the said slats are supported the knives N, each provided with a threaded shank N′ passing between two adjacent slats and fastened in place by nuts $N^2$, as plainly illustrated in Figs. 1 and 8.

The cutting edges of the knives N are formed according to the shape desired to be given to the post or stick to be turned, it being understood that the knives are arranged in such a manner in the frame J that only one or two cut at the same time on the post or stick, but during one full upward sliding movement of the said frame J, the several knives carried by the same are brought in contact with the outer face of the stick or post so that the latter is cut throughout its length as will be readily understood by reference to Fig. 8. By this arrangement the cuts are made on the post or stick successively, and consequently it does not require a very great power to rotate the heads C and F carrying the sticks or posts. Furthermore the operator can conveniently change the positions of the knives on the frame J according to the desired configuration to be given to the post or stick, it being understood that a frame J may be prepared with a series of knives N, so as to cut the posts or sticks to a predetermined design.

It is understood that when the gear wheel H is in mesh with the gear wheel I′, then a perfectly round post or stick will not be turned, but such a form will be given to it that it is perfectly symmetrical and is of the greatest service in finishing off the top ends of the turnings with a round tenon to enable the finisher to put the posts together in connection with an upper rail for instance, by boring a round hole and inserting the end of the spindle or post. When the gear wheel H is in mesh with the gear wheel I′, then the posts or sticks can be readily formed with dovetails or tenons, on the lower ends of spindles, for instance, or at the upper ends of table legs, &c., and this is of considerable importance for the tenons or dovetails will all be cut exactly the same size and when the spindle or leg is finished and is taken off the lathe, then it is ready to be put in place without any fitting or finishing whatever.

It is understood that the knives are preferably set on the frame J in such a manner that when the frame is raised by the operator manipulating the lever L, then the knives will cut one or two at a time, instead of all the knives at the same time. By this arrangement the machine will run much more smoothly and take considerably less power to do better than the machines heretofore constructed.

It is understood that the knives at the top of the frame J will cut and pass above the center of the revolving posts or sticks, and then the knife or knives set in the next bars $J^2$ below, will cut, and so on until the entire frame J has passed above the center of the shaft B, after which the frame is permitted to drop down into its lowermost position to be again started upward by the operator manipulating the lever L. If it should happen that the knife should slip, or that a design was ordered requiring some particular shape for which no knife was at hand, then the operator, after passing the knives over the work, as previously described, when raising the frame, and after again lowering the latter, takes his chisel in hand and manipulates the same so as to add to the design cut by the fixed blade, the special desired cut. The top of the knife frame forms a suitable rest for using hand tools.

For small orders of special pattern, an ordinary wood turner can cut them by hand, as he could turn the same design in round on an ordinary lathe, and in this manner save the time of setting up the knives, but for large orders or for cutting large quantities of a stock pattern, the knives set in a frame in the regular order are of the greatest value as it enables the operator to turn out the work with the greatest rapidity and in the best manner, and without the exercise of any skill whatever.

In placing the posts or sticks in the lathe, and it is desired that a square base should be left, the machine is first geared to the desired motion by shifting the gear wheel H, so as to mesh with the corresponding gear wheel of the cone gear wheel I, and then each post or stick is supported on the spindles D and E, in such a manner that its flat face will start from the knife. In the same way if it is desired to cut an octagon spindle to be finished with the two-sided dovetail, then it is necessary that the flat faces of the spindles come all in line, and is absolutely necessary that the operator change the gear from an eight-sided form to a two-sided form, and then loosen the spindles in the machine. Now, as the latter are revolved slowly, the operator turns each one, so that a certain flat side will come to the rest at the top of the knife frame, or be perpendicular when in position to be in close contact with the knives if the frame were raised. If this were not done, the result of changing the gear from an eight-sided to a two-sided form would be to give the spindles all a half-turn at each revolution, and cut the two-sided dovetails, but as the gear was changed when the spindles were at different distances from the cutting knives, the dovetails and the flat sides of the octagons will not have the same relative positions to each other on any two of the spindles.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. In a turning lathe, the combination with a main shaft, of live spindles carried by said shaft, and gearing for revolving the spindles on their centers from the main driving shaft and at a rate of speed that bears the same relation to the speed of the main shaft that one side of the material to be cut bears to the whole number of sides to be cut, substantially as described.

2. In a turning lathe, the combination with a main shaft, and live spindles carried thereby and provided with pinions, of a cone gear on the main shaft, and gearing between the cone gear and the pinions of the said spindles, substantially as described.

3. In a turning lathe, the combination with a main shaft, a head carried by said shaft, and live spindles mounted in the head and provided with pinions, of a gear wheel mounted loose on the shaft and meshing with the pinions of the spindles, a cone gear fast on the main shaft and gearing between the cone gear and the loose gear wheel on the main shaft, substantially as shown and described.

4. In a turning lathe, the combination with a main shaft, a head secured to the shaft and live spindles mounted in the head and provided with pinions, of the cone gear I fast on the main shaft, the gear wheel G loose on the said main shaft and meshing with the pinions of the spindles, the gear wheel G′ meshing with the gear wheel G, the gear wheel $G^3$ meshing with the gear wheel G′ and the gear

wheel H meshing with the gear wheel $G^3$ and with one of the cone gears, substantially as described.

5. In a turning lathe, the combination with a main shaft, a head secured to the shaft, and live spindles mounted in said head and provided with pinions, of the cone gear I fast on the main shaft, the gear wheel G loose on the said main shaft and meshing with the pinions of the spindles, the gear wheel G′ meshing with the gear wheel G, the elongated gear wheel $G^3$ meshing with the gear wheel G′ and the gear wheel H meshing with the elongated gear wheel $G^3$ and with one of the cone gears, the shafts of the gear wheels G′ $G^3$ and H being adjustable and the wheel H adjustable on its shaft, substantially as herein shown and described.

6. A wood turning lathe, provided with a tail head, keys fitted to slide longitudinally on the driving spindle and on which the said tail head is keyed, the said keys being provided with rack teeth, a hand wheel provided with worm wheel teeth engaging the said rack, and collars between which operates the said hand wheel and adapted to be fastened in place on the main driving shaft, substantially as shown and described.

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