No. 632,100. Patented Aug. 29, 1899.

L. A. CARSON.

AUTOMATIC LATHE.

(Application filed Feb. 23, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

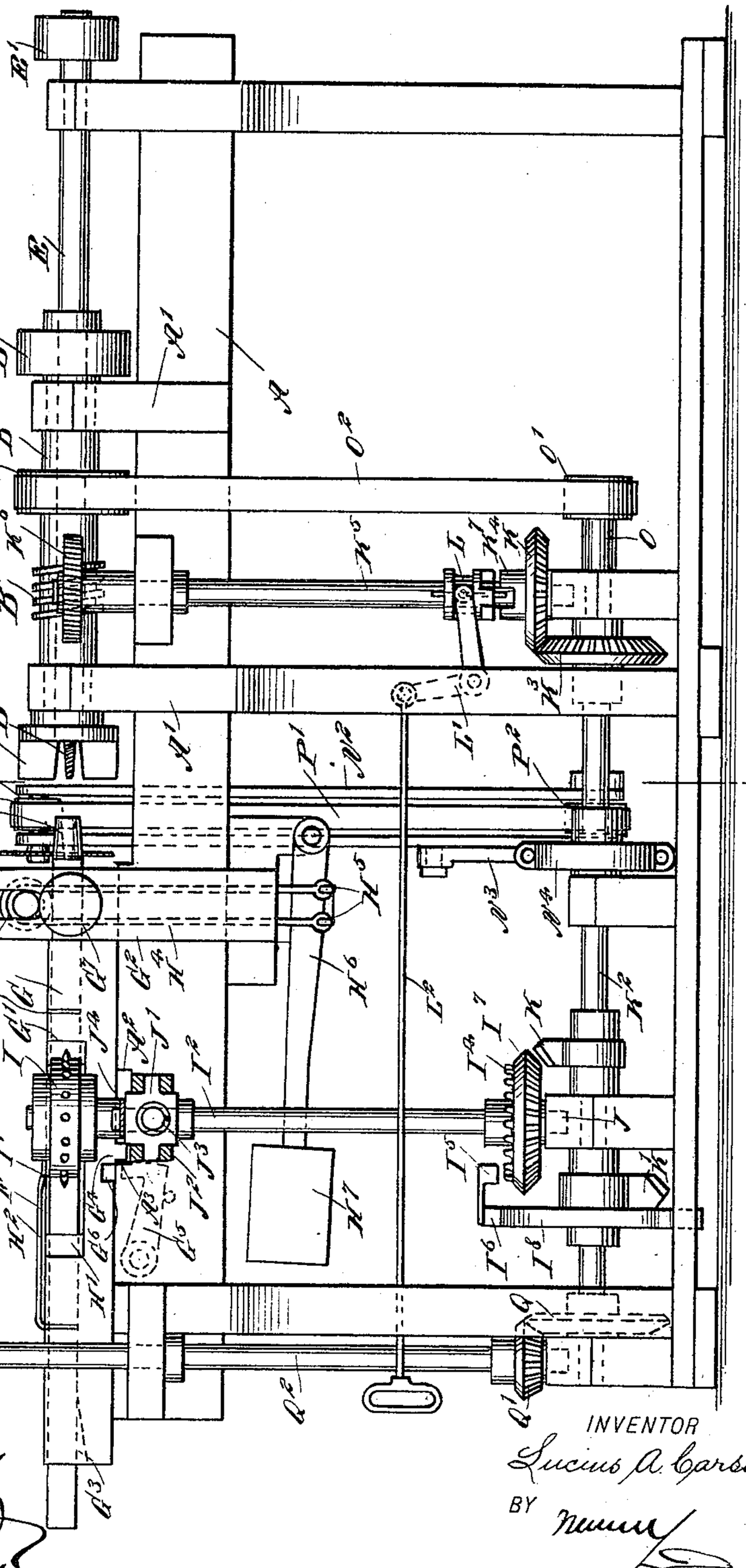

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FIG. 2.

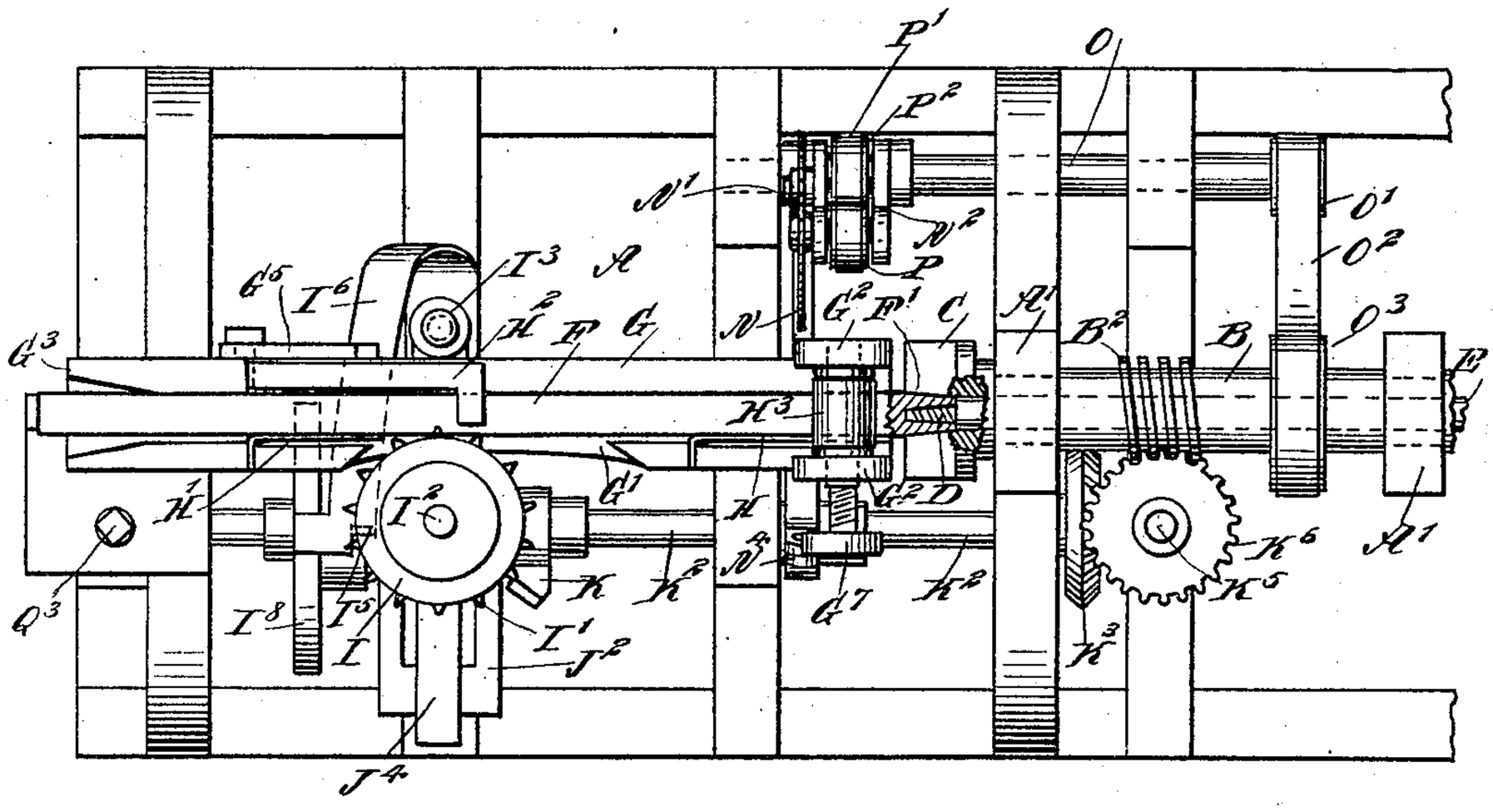
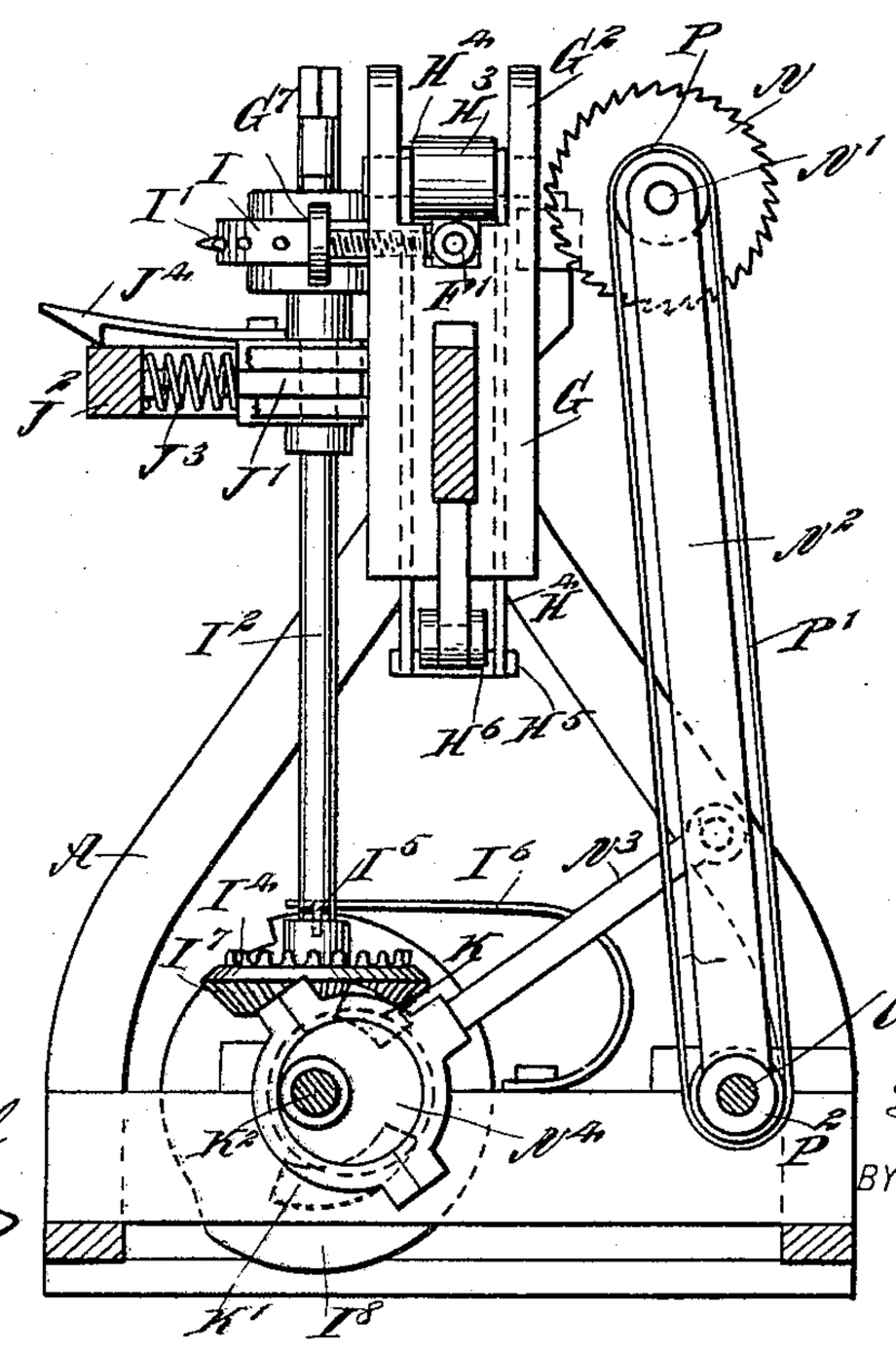


FIG. 3.



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UNITED STATES PATENT OFFICE.

LUCIUS A. CARSON, OF HOPEDALE, OHIO.

AUTOMATIC LATHE.

SPECIFICATION forming part of Letters Patent No. 632,100, dated August 29, 1899.

Application filed February 23, 1899. Serial No. 706,571. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS A. CARSON, of Hopedale, in the county of Harrison and State of Ohio, have invented a new and Improved Automatic Lathe, of which the following is a full, clear, and exact description.

The invention relates to woodworking machinery; and its object is to provide a new and improved automatic lathe more especially designed for automatically turning, boring, sawing off, and completely finishing small articles of wood—such as spools, cones, and the like—the lathe being simple and durable in construction and arranged to finish a large quantity of articles in a comparatively short time.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts on all the views.

Figure 1 is a side elevation of the improvement with parts in section. Fig. 2 is a plan view of the same with parts in section, and Fig. 3 is a transverse section of the same on the line 3 3 in Fig. 1.

The improved lathe is mounted on a suitably-constructed frame A, supporting headstocks A′, in which is journaled a hollow shaft B, carrying a pulley B′, connected by belt with other machinery for imparting a turning motion to the said shaft. On the forward end of the shaft is arranged a cutter-head C, having longitudinally-extending but inclined cutting edges grouped around an auger or gimlet D, projecting centrally at the cutter-head, but secured to the forward end of a shaft E, extending in the hollow shaft B and journaled at its outer end in a bearing on the frame A. On the shaft E is secured a pulley E′, connected by belt with other machinery for imparting a rotary motion to said shaft E to drive the latter at a higher rate of speed than the speed given to the shaft B.

It is evident from the foregoing that when the shafts B and E are simultaneously rotated the cutter-head C is driven at a slower rate of speed than the auger D, but both simultaneously engage the forward end F′ of a stick of wood F, to turn the outer surface of the end of the stick into cone shape, as indicated in Fig. 1, and bore a hole in the said cone-shaped end by the section of the auger D. The stick of wood F is held to slide in or to bodily move with a carriage G, mounted to slide longitudinally on a suitable guideway on the frame A, but locked against movement when working long sticks F and unlocked and moved by hand when working short pieces, as hereinafter more fully described. In either case it is the object to bring the forward end of the stick or a short piece F in engagement with the auger D and the cutting edges of the cutter-head C for the purpose above described.

In order to allow the stick F to slide in the carriage G and hold it against accidental movement, I provide springs H H′, held on the carriage and engaging with their free ends one side of the stick to press the same against the opposite side of the bearing in the carriage. A spring H^2, also secured to the carriage, extends across the top of the stick to hold the same down in its bearing in the carriage. A roller H^3 rests on the top of the stick, near the front end thereof, and this roller is journaled loosely in suitable bearings G^2, carried by the carriage G. The roller H^3 is pressed downward in contact with the stick to hold the latter firmly in position while the auger D and cutter-head C are on the forward end thereof, and for this purpose the said roller is engaged by two straps H^4, bent into U shape, their lower ends being connected with each other by a cross-beam H^5, on which rests a lever H^6, fulcrumed on the carriage G and carrying at its outer end an adjustable weight H^7 for causing the roller H^3 to bear with more or less force on the stick of wood F.

The forward side of the carriage G is cut out near its upper portion, as at G′, and through this cut-out portion projects the periphery of a horizontally-disposed wheel I, having spikes I′, adapted to engage the sides of the stick F at the cut-out portion to move the stick forward in the direction of the arrow *a′* when the wheel I is rotated. The wheel I is secured on the upper end of a shaft I^2, set loosely at its lower end in a step J, carried by the frame A, to permit a slight transverse swinging motion of the shaft, with the step

end as a fulcrum. The upper portion of the shaft I^2 is mounted to turn in a bearing J', fitted to slide transversely in suitable guideways J^2, projecting from the main frame A. A spring J^3 presses on the bearing J' to hold the shaft I^2, with the wheel I, normally in an innermost position and engage the spikes I' with the side of the stick F. A catch J^4, held on the bearing J', serves to lock the latter in an outermost position to hold the spikes I' out of engagement with the sides of the stick F in the carriage G when it is desired to feed the stick or short pieces by hand. The catch J^4 is then engaged with the outer end of the guideway J^2, as will be readily understood by reference to Fig. 3.

In order to prevent binding of the carriage G, I provide a friction-roller I^3, journaled on a suitable stud carried by the frame A and in frictional contact with the rear side of the carriage G directly opposite the wheel I. (See Fig. 2.)

The outer end of the carriage G is formed with a flaring mouth G^3 to permit of conveniently placing a stick in the carriage, and the longitudinal movement of the carriage is limited by a lug G^4, operating between two shoulders A^2 A^3, formed on the frame A under the middle of the carriage, as indicated in Fig. 1.

The carriage is normally locked against movement in a longitudinal direction by a latch G^5, pivoted to the frame and adapted to engage a recess G^6 in the carriage; but when it is desired to feed the stick or short pieces by hand the latch G^5 is swung downward out of locking engagement with the carriage to permit of moving the carriage with the piece secured therein. In case the stick or short piece is to be locked in place in the carriage I provide a set-screw G^7, under the control of the operator and screwing in the bearing G^2, to engage one side of the stick directly under the roller H^3.

In order to impart an intermittent forward-and-backward rotary motion to the wheel I, I provide the lower end of the shaft with a bevel gear-wheel I^7, adapted to be alternately engaged by mutilated bevel gear-wheels K K', secured on a shaft K^2 and standing approximately opposite each other, as indicated in Figs. 1 and 3. The shaft K^2 is journaled in suitable bearings in the lower portion of the frame A, and one end thereof carries a bevel gear-wheel K^3, in mesh with a bevel gear-wheel K^4, mounted to rotate loosely on the lower end of a vertically-disposed shaft K^5, journaled in suitable bearings on the frame A. The upper end of said shaft K^5 carries a worm-wheel K^6, in mesh with a worm B^2 on the hollow shaft B, so that when the latter is rotated the worm B^2 transmits a rotary motion to the worm-wheel K^6 and the shaft K^5. The rotary motion of the latter is transmitted by a clutch L to the clutch-shaped hub K^7 of the bevel gear-wheel K^4, so that the latter is rotated at the time the clutch is in mesh with the clutch on the hub K^7. The rotary motion of the wheel K^4 is then transmitted by the bevel gear-wheel K^3 to the shaft K^2, and the mutilated gear-wheels K K' alternately turn the bevel gear-wheel I^7 in opposite directions to shift the stick F first forwardly in the direction of the arrow a' and then in the inverse direction thereof. It is understood that when the mutilated gear-wheel K' is in mesh with the gear-wheel I^7 the stick is shifted in the direction of the arrow a', and when the mutilated gear-wheel K is in mesh with the bevel gear-wheel I^7 then the stick is moved in the inverse direction of the said arrow a'. The mutilated gear-wheel K' is formed with more teeth than the gear-wheel K, so that the stick is moved a greater distance forward than backward, the difference in movement corresponding to the length of the article to be formed. During the forward movement of the stick the projecting end is moved in engagement with the cutter-head and auger and a hole is bored therein, and then the stick is moved backward to bring the base end of the cone opposite the saw N, which is now moved transversely to cut off the cone, as hereinafter more fully described.

In order to lock the gear-wheel I^7, the shaft I^2, the wheel I, and consequently the stick F, against accidental return movement during the time the saw is cutting off the cone, I provide the top of the gear-wheel I^7 with teeth I^4, adapted to be engaged by a dog I^5, formed on the free end of a spring I^6, riding on the peripheral surface of a cam I^8, secured to the shaft K^2. During the time the gear-wheels K K' are out of mesh with the wheel I^7 the dog I^5 engages adjacent teeth I^4 to lock the wheel I^7 against rotation, and immediately previous to the rear wheel K' moving in mesh with the gear-wheel I^7 the cam I^8 swings the spring I^6 upward to lift the dog I^5 out of engagement with the teeth I^4 and allow rotation of the gear-wheel I^7 by the mutilated gear K'. The spring I^6 is preferably secured to the bearing or step for the shaft I^2.

The circular saw N for cutting off the bored and turned end of the stick F is secured on an arbor N', journaled in suitable bearings in the upper end of a frame N^2, mounted to swing loosely on a shaft O as a fulcrum, the said shaft being journaled in suitable bearings in the lower part of the frame A, directly in the rear of the shaft K^2. On the arbor N' is secured a pulley P, over which passes a belt P', also passing over a pulley P^2, secured on the shaft O. The latter carries a pulley O', connected by a belt O^2 with a pulley O^3 on the hollow shaft B, so that when the latter is rotated a rotary motion is given to the shaft O, the arbor N', and the saw N. The saw N normally stands out of engagement with the stick F, but is swung over to cut off the end of the stick after the latter has been returned to its rearward position, as shown in Fig. 1, and for this purpose the frame N^2 for the saw-arbor is pivotally connected with the eccentric-rod N^3 of

an eccentric N^4, held on the shaft K^2. The eccentric N^4 is so set relatively to the mutilated gear-wheels K K′ that when the said wheels are out of mesh with the gear-wheel I^7 the eccentric N^4 swings the frame N^2 over to cause the saw N to cut off the finished end of the stick and to then swing the saw back to its former position previously to the gear-wheel K′ moving in mesh with the gear-wheel I^7.

The clutch L is under the control of the operator to permit of throwing the automatic feed out of gear whenever it is desired to feed the stick by hand. The clutch is for this purpose engaged by a bell-crank lever L′, connected with a shifting rod L^3, adapted to be taken hold of by the operator for throwing the said clutch L in or out of engagement with the hub K^7 of the gear K^4. In order to properly feed the stick or short pieces F by hand instead of automatically, as described, it is necessary to throw the clutch L out of mesh with the gear-wheel K^4 and to turn the shaft K^2 by hand. For this purpose the outer end of the shaft K^2 is provided with a bevel gear-wheel Q in mesh with a bevel gear-wheel Q′, held on the lower end of a vertically-disposed shaft Q^2, journaled in suitable bearings on the main frame A. The upper end Q^3 of the shaft Q^2 is made polygonal to receive a crank-arm or the like for conveniently turning the shaft by hand. It is evident that when the shaft Q^2 is turned by hand a rotary motion is given to the shafts Q^2 K^2 I^2 and the wheel I to feed the stick F in the manner above described.

When it is desired to use up short pieces, the carriage is unlocked by swinging the arm G^5 out of engagement with the notch G^6, and the piece is secured in the forward end of the carriage by the screw G^7, the piece projecting beyond the carriage a length corresponding, approximately, to the finished article. The carriage is now moved forward by hand to bring the projecting end to the cutter and auger and turn the end into cone form and bore the cone. The lug G^4 of the carriage abuts on the shoulder A^2 when the cone is finished, and the carriage is then moved backward until the lug G^4 abuts on the rear shoulder A^3, and then the saw is brought over to cut off the cone from the piece. The remaining portion of the piece, if long enough, is now again adjusted in the carriage and again secured in place by the screw G^7, and the above-described operation is then repeated. A number of short pieces may be placed in the carriage one behind the other and temporarily fastened together by staples to form a stick adapted to be fed forward either by hand or power.

The machine is very simple and durable in construction, is completely automatic in operation, is not liable to get out of order, and permits of turning out a large number of articles in a comparatively short time and without any assistance whatever on the part of the operator.

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

1. An automatic lathe, comprising a support for a stick, a spiked wheel for engaging the stick to move it in the support, means for rotating the wheel intermittently in opposite directions and different distances, and tools for operating successively upon the stick in the different positions to which it is moved, substantially as described.

2. An automatic lathe, comprising a support for a stick, a spiked wheel for engaging the stick to move it in the support, means for rotating the wheel intermittently in opposite directions and different distances, means for holding the stick in the support against accidental movement, and tools for operating successively upon the stick in the different positions to which it is moved, substantially as described.

3. An automatic lathe, comprising a support for a stick, a spiked wheel for engaging the stick to move it in the support, means for rotating the wheel intermittently in opposite directions, a rotary cutter-head and auger in the center of the head for turning and boring a hole in the end of the stick when the stick is moving in one direction, and a saw for cutting off the stick when moved in the opposite direction, substantially as described.

4. An automatic lathe, comprising a support for a stick, a spiked wheel for engaging the stick to move it in the support, means for rotating the wheel intermittently in opposite directions and different distances, means for holding the stick in the support against accidental movement, a cutter-head and auger in the center of the head for turning and boring a hole in the stick when moving in one direction, and a saw for cutting off the stick when moved in the opposite direction, substantially as described.

5. An automatic lathe, provided with a cutter-head and an auger, for simultaneously turning and boring the end of a stick to be treated, a support for containing the stick, having sides, one of which is provided with a cut-out portion means for holding the stick in the support, and a spiked wheel mounted at one side of the support and having an intermittent forward-and-backward rotary motion, the spikes of the wheel being adapted to project through the cut-out portion of the side of the support, and to engage the stick and shift the latter in the support, substantially as shown and described.

6. An automatic lathe, provided with a cutter-head and an auger, for simultaneously turning and boring the end of a stick to be treated, a support for containing the stick, means for holding the stick in the support, a spiked wheel having an intermittent forward-and-backward rotary motion, the spikes of the wheel being adapted to engage the stick and shift the latter in the support, a shaft carrying said spiked wheel, a bevel gear-wheel

on said shaft, and mutilated gear-wheels adapted to intermittently engage said bevel gear-wheel, to impart an intermittent forward-and-backward rotary motion to the same, substantially as shown and described.

7. An automatic lathe, provided with a cutter-head and an auger, for simultaneously turning and boring the end of a stick to be treated, a support for containing the stick, means for holding the stick in the support, a spiked wheel having an intermittent forward-and-backward rotary motion, the spikes of the wheel being adapted to engage the stick and shift the latter in the support, and means, substantially as described, for locking said spiked wheel against rotation during the time the cutter-head and auger act on the stick, as set forth.

8. In an automatic lathe, the combination with a carriage for supporting a stick, and means for locking the carriage stationary, of a shaft having its lower end fulcrumed and its upper end projecting up by the side of the carriage and mounted in a laterally-sliding bearing, a spiked wheel on the upper end of the shaft for engaging a stick to move it in the carriage, and means for locking the bearing in an outermost position, to disengage the wheel from the stick, whereby when the carriage is released, it can be moved to feed the stick, substantially as described.

9. In an automatic lathe, the combination with a carriage for supporting a stick and means for locking the carriage stationary, of a vertical shaft having its lower end loosely set in a step, a laterally-sliding and spring-pressed bearing in which the upper end of the shaft is mounted, a catch for locking the bearing in an outermost position, and a spiked wheel on the upper end of the shaft for engaging the stick to move it, substantially as described.

10. In an automatic lathe, the combination with a support for a stick, and tools for operating successively upon the stick of a vertical shaft, a spiked wheel on the shaft for engaging the stick, a gear-wheel on the lower end of the shaft, a horizontal shaft, and mutilated gear-wheels on the horizontal shaft and alternately engaging the gear-wheel of the vertical shaft, substantially as described.

11. In an automatic lathe, the combination with a support for a stick and tools for operating successively upon the stick, of a vertical shaft, a spiked wheel on the upper end of the shaft for engaging the stick to move it, a bevel gear-wheel on the lower end of the shaft and having teeth on its upper surface, a horizontal shaft, mutilated bevel gear-wheels on the horizontal shaft and engaging alternately the gear-wheel of the vertical shaft, a cam on the horizontal shaft, and a spring carrying a dog for engaging the teeth of the gear-wheel of the vertical shaft, said spring riding on the cam, substantially as described.

12. An automatic lathe, provided with a cutter-head and an auger, for simultaneously turning and boring the end of a stick to be treated, a support for containing the stick, means for holding the stick in the support, a spiked wheel having an intermittent forward-and-backward rotary motion, the spikes of the wheel being adapted to engage the stick and shift the latter in the support, a shaft carrying said spiked wheel, a bevel gear-wheel on said shaft, mutilated gear-wheels adapted to intermittently engage said bevel gear-wheel, to impart an intermittent forward-and-backward rotary motion to the same, a cam rotating in unison with said mutilated gear-wheels, and a dog controlled by said cam, and adapted to engage teeth on said gear-wheel and lock the latter and the spiked wheel against rotation during the time the mutilated gear-wheels are out of mesh, substantially as shown and described.

13. In an automatic lathe, the combination with a support for a stick, of a rotary tubular shaft, a cutter-head carried by said shaft, an auger at the center of the cutter-head, a shaft extending through the tubular shaft and carrying the auger, a feed device for feeding the stick, and mechanism between the feed device and the tubular cutter-head shaft for operating the feed device to feed intermittently in opposite directions, substantially as described.

14. In an automatic lathe, the combination with a support for a stick, a feed device for the stick, and means for moving the feed device to feed intermittently in opposite directions, of a cutter-head and auger in the center of the cutter-head for turning and boring the end of the stick, means for rotating the cutter-head and auger at different rates of speed, a saw mounted to swing toward and from the carriage, and means for moving the saw into operative position after the end of the stick has been turned and bored, substantially as described.

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Witnesses:
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THOS. ARBAUGH.