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E. CHILDS.

LATHE.

No. 590,387. Patented Sept. 21, 1897.

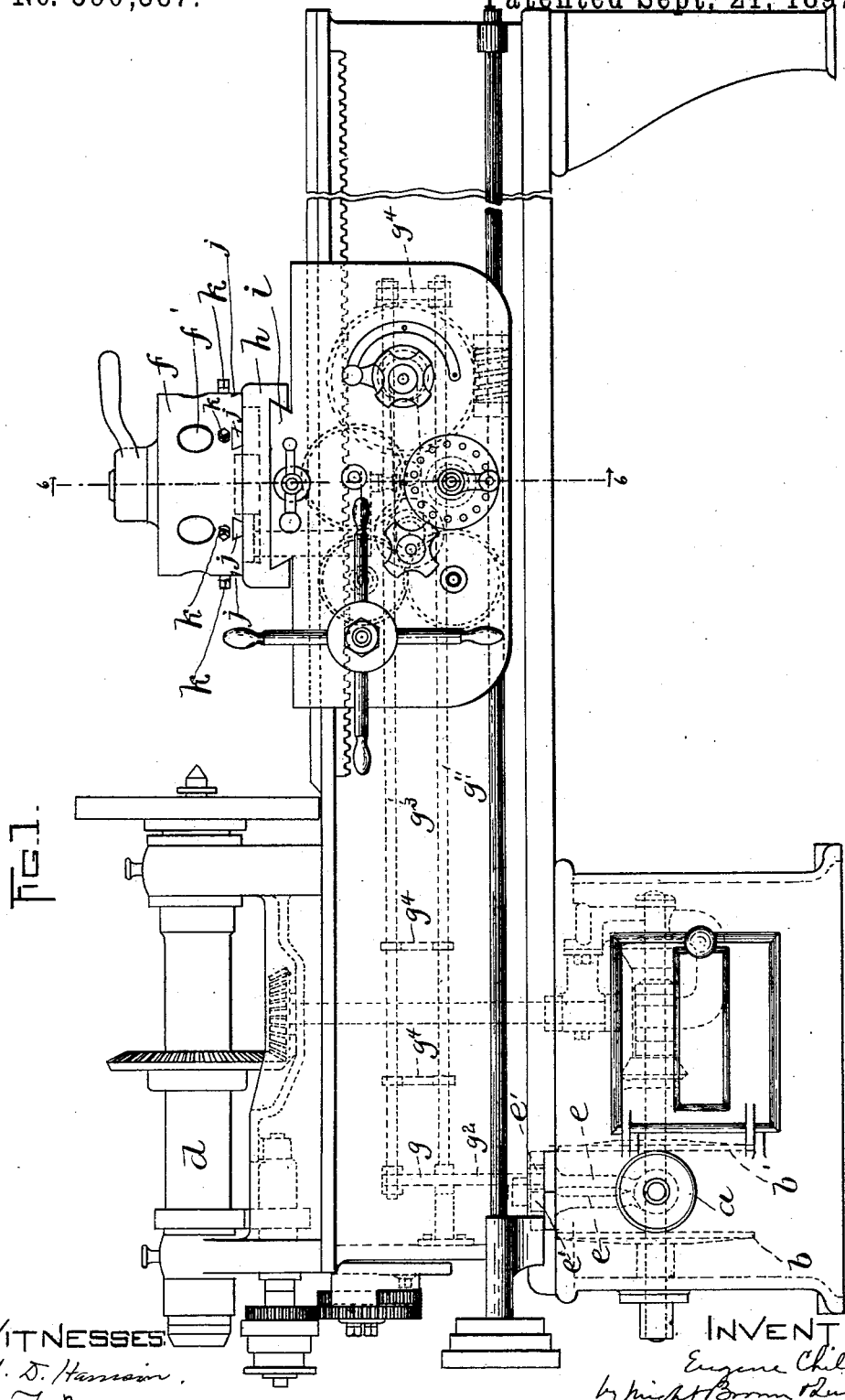

FIG. 1.

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LATHE.

No. 590,387. Patented Sept. 21, 1897.

FIG. 2.

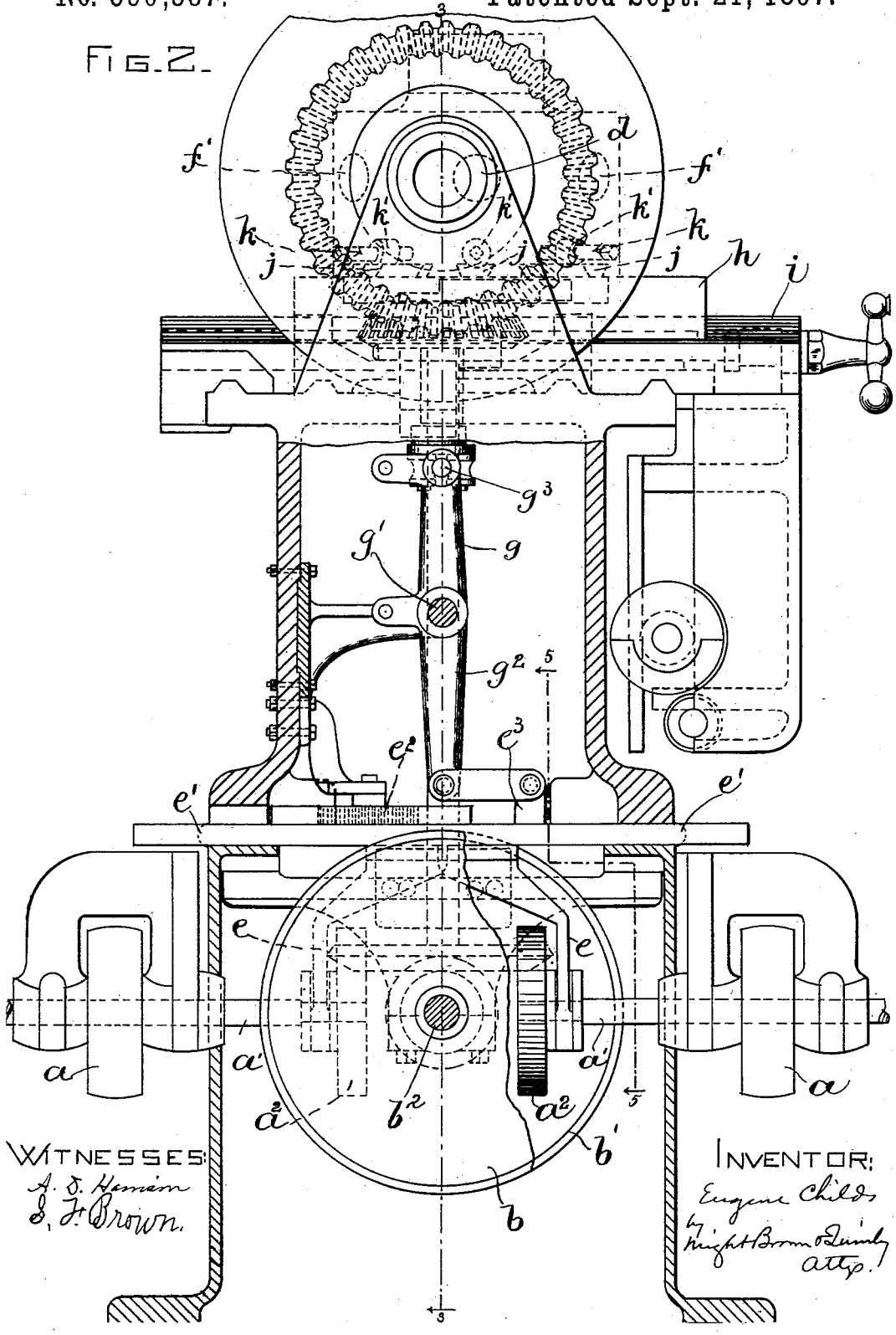

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FIG. 2.

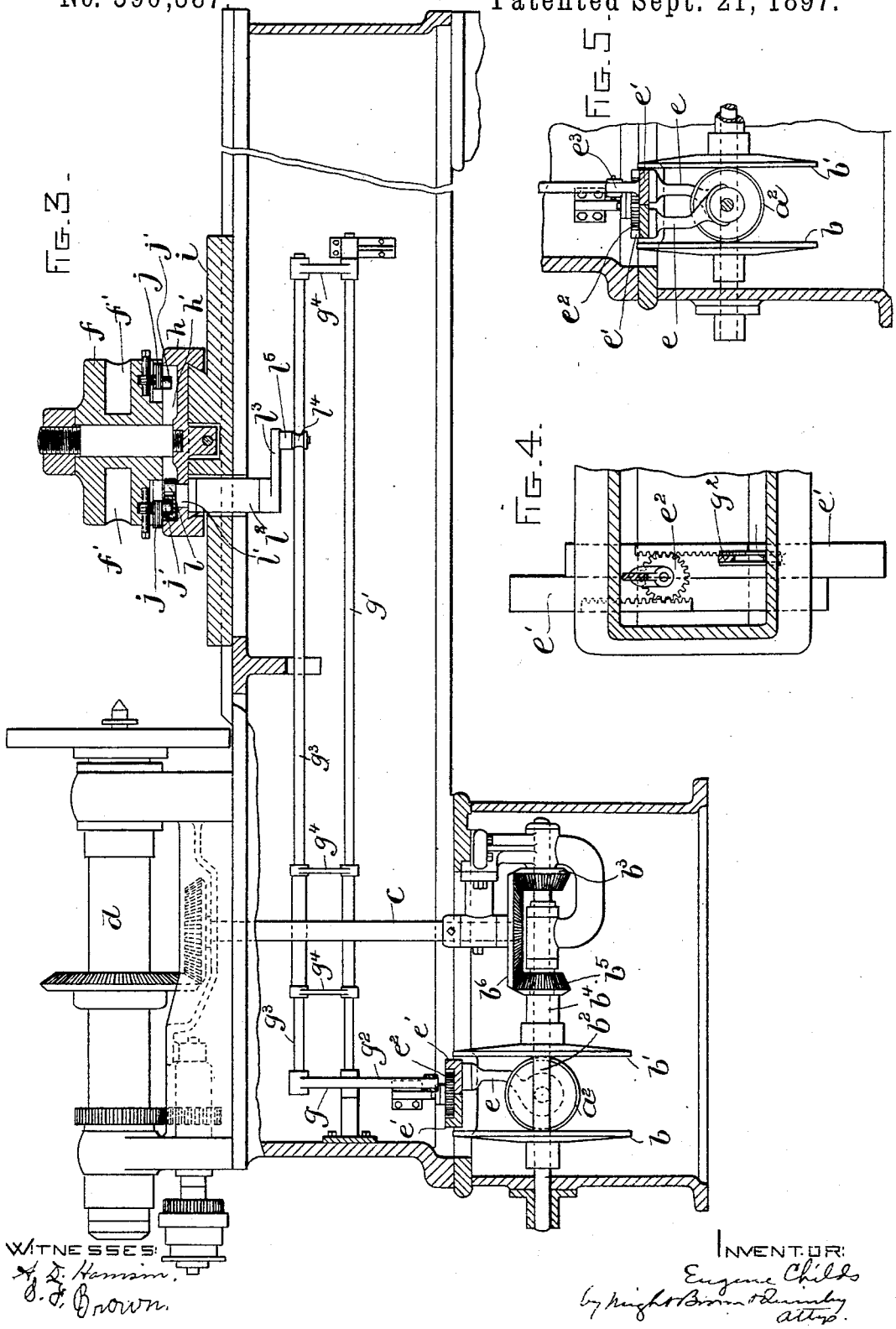

FIG. 5.

FIG. 4.

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No. 590,387. Patented Sept. 21, 1897.

Fig. 6.

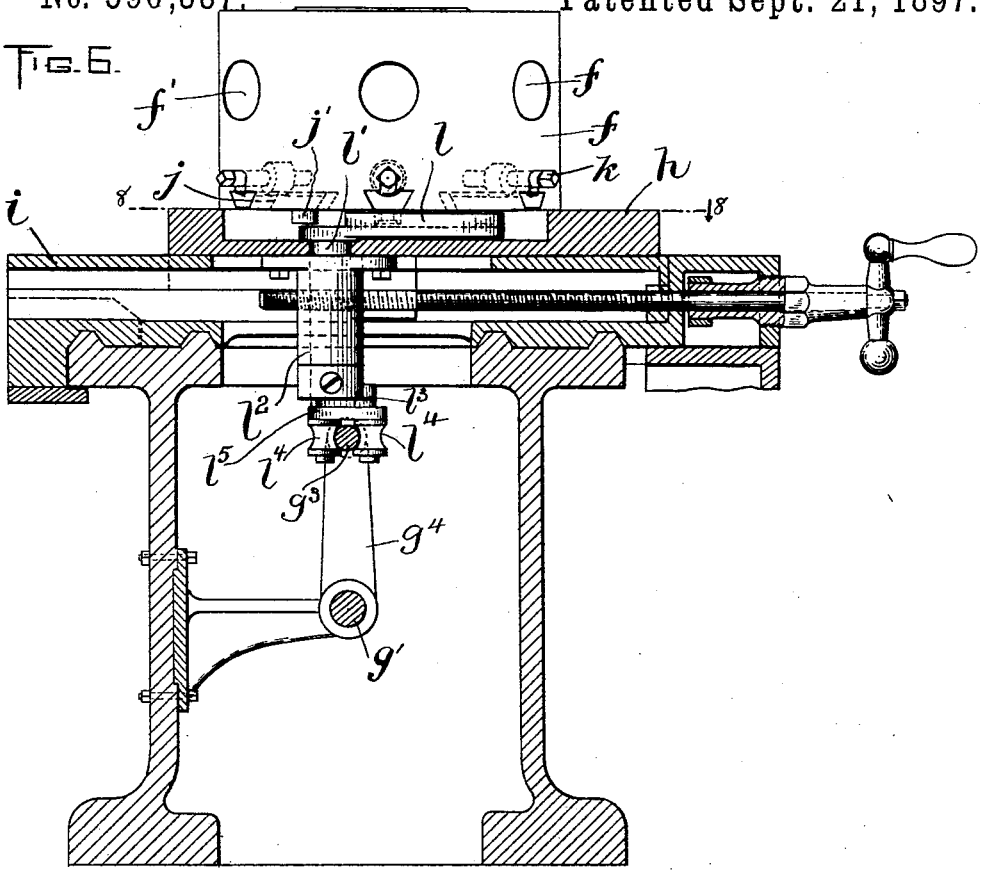

Fig. 7.

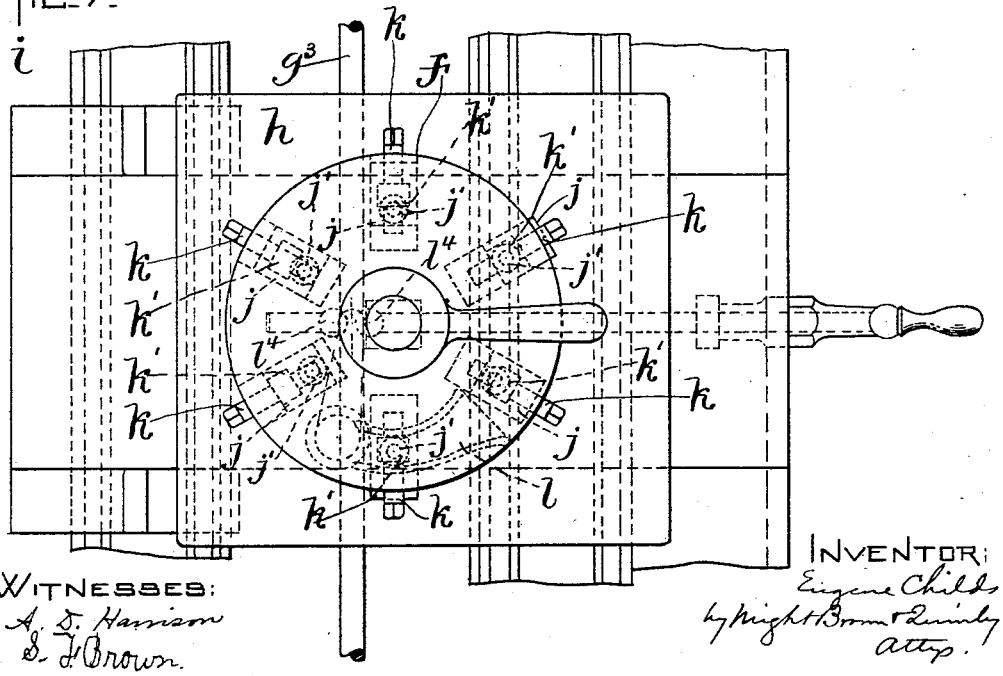

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Fig. 8

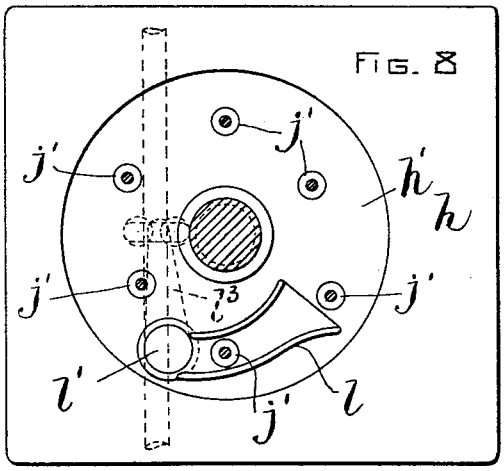


Fig. 10.

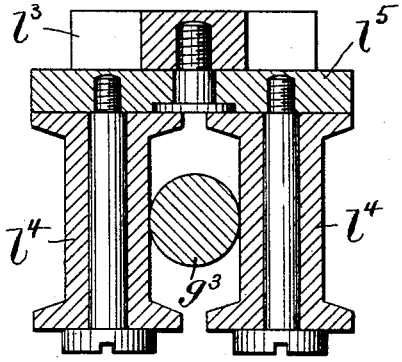


Fig. 9.

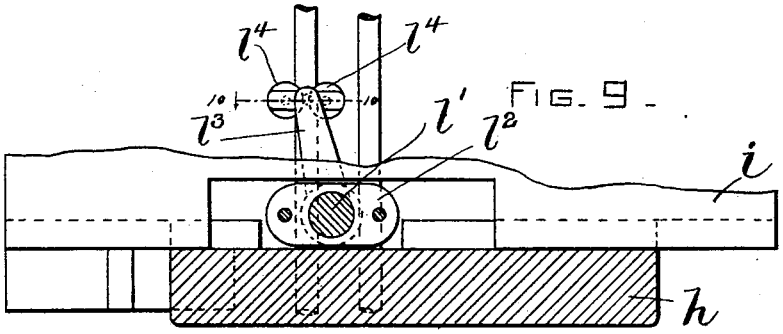


Fig. 11.

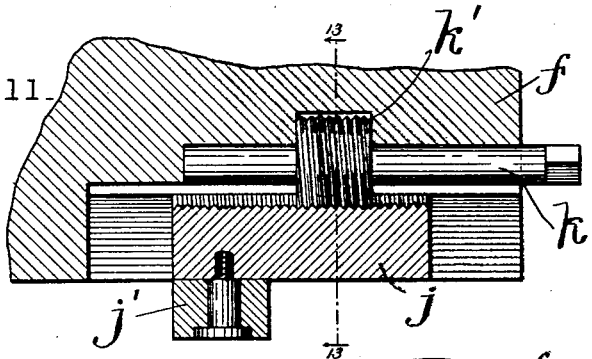
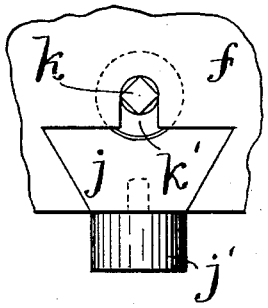


Fig. 12.



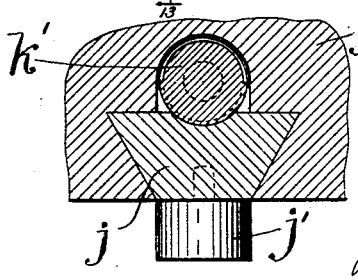


Fig. 13.

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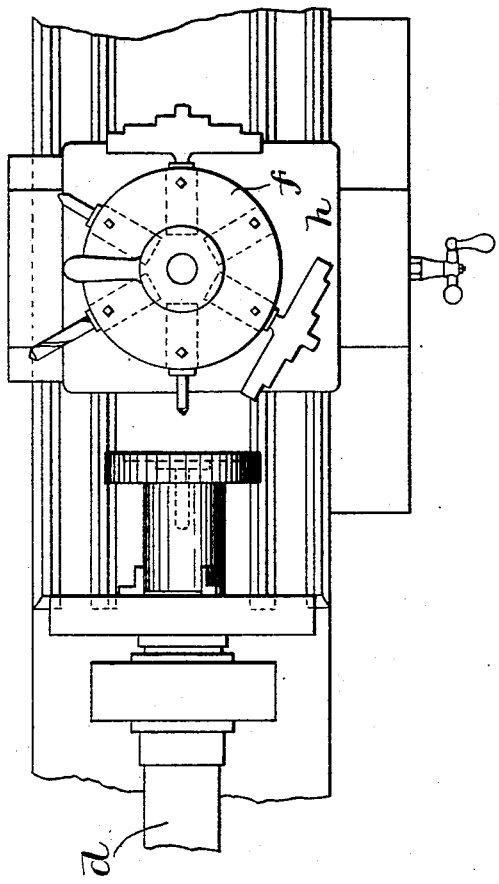

FIG. 14.

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UNITED STATES PATENT OFFICE.

EUGENE CHILDS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AUTOMATIC RAPID LATHE COMPANY, OF SACO, MAINE.

LATHE.

SPECIFICATION forming part of Letters Patent No. 590,387, dated September 21, 1897.

Application filed February 15, 1897. Serial No. 623,424. (No model.)

To all whom it may concern:

Be it known that I, EUGENE CHILDS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

This invention relates to variable-speed lathes, and has for its object to provide a turret-lathe in which the speed of rotation of the work shall be automatically controlled by the position of the turret or its carriage.

The invention consists in the application of turret devices to lathes having mechanism for varying the speed of the spindle, such as the lathe described in Letters Patent No. 550,439, granted to me November 26, 1895.

Of the annexed drawings, forming part of this specification, Figure 1 is a side elevation of my improved lathe. Fig. 2 is a front elevation of the same, partly in section, showing part of the speed-changing mechanism. Fig. 3 is a vertical section, partly in elevation, on the line 3 3 of Fig. 2. Fig. 4 is a plan view of the slides forming part of the speed-changing mechanism. Fig. 5 is a section on the line 5 5 of Fig. 2. Fig. 6 is a section on line 6 6 of Fig. 1, showing the turret in elevation. Fig. 7 is a top view of the turret and its carriage. Fig. 8 is a section on line 8 8 of Fig. 6. Fig. 9 is a horizontal sectional view showing a portion of the mechanism beneath the turret. Fig. 10 is a section on line 10 10 of Fig. 9. Fig. 11 is a vertical sectional view of one of the sliding blocks in the turret. Fig. 12 is an end view of the same. Fig. 13 is a section on line 13 13 of Fig. 12. Fig. 14 is a top view of the turret and of the chuck supporting a piece of work.

The same letters indicate the same parts in all the figures.

In my improved lathe power is applied from a convenient source by belts or other means to either or both of two pulleys a a, mounted upon independent shafts a' a' and splined thereto, so that said shafts are capable of longitudinal movement in their bearings and through the said pulleys. a^2 a^2 are friction-wheels fixed to the inner ends of said shafts and revolving therewith at a constant speed in opposite directions in frictional contact with the inner faces of two friction-disks b b'. The disk b is attached to a shaft b^2, to which is fixed a bevel-gear b^3, and the disk b' is attached to a sleeve b^4, to which is fixed a bevel-gear b^5, the said gears meshing with a bevel-gear b^6, fixed to the lower end of a vertical shaft c, which is geared at its upper end to the head-stock spindle d and drives the said spindle. It will be seen, therefore, that the speed of said work-rotating spindle d is varied by varying the distance of the friction-wheels a^2 a^2 from the center of the disks b b'. The said friction-wheels are carried by hangers e e, attached to slides e' e', resting on a bed which forms part of the framework of the lathe. Each of the said slides is provided with a rack meshing with the teeth of a horizontal pinion e^2, supported on a fixed bearing, so that a longitudinal motion imparted to one slide e' will cause the other slide e' to move in the opposite direction. The operation of these slides is controlled from the turret f by the mechanism about to be described.

g represents a crank-arm which is preferably mounted on a rock-shaft g', extending for a considerable portion of the length of the lathe-bed and journaled in suitable supports fixed to the inner walls of the said lathe-bed. The said crank has a prolongation g^2 below the rock-shaft g', the said prolongation constituting an arm which is connected with a lug e^3, formed on one of the slides e', so that an oscillating or rocking motion imparted to the crank g or rock-shaft g' will cause the slides e' e' and the friction-wheels a^2 a^2 to move in or out in the manner before described.

g^3 represents an elongated rod having one end fixed to the upper end of the crank g and extending therefrom at right angles approximately parallel with the shaft g' and being connected with the said shaft at suitable points by cross-braces or connecting-struts g^4 g^4, so as to form a substantially rigid structure with the same. The said rod g^3 constitutes an elongated wrist for the crank g and will be hereinafter referred to as such.

The lathe which I am describing is of the well-known turret construction, whereby a number of successive operations on the same piece of work are performed expeditiously by

the use of a multiple tool-holder. I show herewith a parallel-feed carriage *i*, supporting a cross-feed carriage *h*, upon which is revolubly mounted a turret tool-holder *f*, the said turret having a number of tool-holding apertures *f'*. Beneath the said apertures, and preferably beneath each one, are a number of sliding blocks *j*, horizontally mounted in grooved or dovetailed guides formed in the turret and adapted to slide in and out in a direction radial with the center of the said turret *f*. Each block *j* is provided with means for sliding it in or out in its guides, the said means consisting of a concave screw-threaded upper surface and a revoluble spindle *k*, having an enlarged screw-threaded portion adapted to engage the threaded portion of the block *j*. The said spindles *k* are fitted into cavities formed in the turret above the sliding blocks, and being capable of rotation but not of longitudinal movement cause the said blocks *j* to slide in or out when the spindles *k* are turned. The outer ends of the said spindles are preferably squared for engagement with a wrench or similar instrument. Each block *j* is further provided on its under surface with a roller *j'*, the said rollers projecting downwardly underneath the turret *f* into a circular cavity *h'*, formed in the turret-carriage *h*.

l represents a horizontal arm adapted to swing in the cavity *h'* just underneath the turret *f* and pivoted to a vertical shaft *l'*, which is journaled in a sleeve-bearing l^2, bolted to the under side of the turret-carriage *h*. The said arm is curved in the arc of a circle for a portion of its length and has guides along its upper portion consisting of upright sides which flare toward the outer end of the arm, forming a mouth for the reception of the rollers *j'*. At the lower end of the shaft *l'*, inside the lathe-bed and making substantially a right angle with the arm *l*, is fixed an arm l^3, which has an attachment at its outer end by which it engages the wrist g^3.

The arm *l*, the shaft *l'*, and the arm l^3 are rigidly connected and are adapted to oscillate together. Each of the rollers *j'*, which project downwardly from the under side of the turret *f*, is adapted to enter and engage the trough-shaped arm *l*, causing it to assume a position corresponding to the radial position of the said roller, and thereby causing the arm l^3 to move the wrist g^3 and thus change the speed of the work-supporting spindle *d*. It now becomes apparent that by adjusting the several sliding blocks *j* according to the speed desired the spindle *d* can be given a different speed for each tool in the turret, the change of speed being accomplished simultaneously with the change of tool by merely rotating the turret on its axis, the roller *j'* engaging and remaining in the arm *l* while the tool is at work. It will be observed also that while a particular tool is at work the speed of the spindle *d* may also be varied by sliding the turret-carriage *h* in or out by means of the cross-feed screw, the said speed increasing as the diameter of the work decreases or as the tool approaches the center of the work.

The attachment referred to, by means of which the arm l^3 engages the upper bar of the wrist g^3, consists of two spool-shaped rollers l^4 l^4, Fig. 10, attached to a yoke l^5, which is pivoted underneath the said arm l^3 and at the outer end thereof. The said rollers are preferably parallel-sided to allow of vertical movement of the wrist g^3 and are placed one on either side of the said bar. The said rollers are thus adapted to slide along the said bar with the parallel-feed carriage *i* or to displace it sidewise when the arm l^3 is oscillated.

I claim—

1. A lathe having a work-rotating spindle, a turret tool-holder, mechanism for varying the speed of the spindle, and means operated by the rotation of the said tool-holder for controlling the said mechanism.

2. A lathe having a work-rotating spindle, a turret tool-holder adapted to be rotated and having independently-adjustable operating devices, such as the rolls *j'*, mechanism for varying the speed of the spindle, and intermediate mechanism controlled by said operating devices to operate the said speed-varying mechanism.

3. A lathe having a work-rotating spindle, mechanism for varying the speed of said spindle, a tool-holding turret, a sliding carriage supporting said turret, a sleeve-bearing fixed to said carriage, a vertical shaft adapted to turn in said bearing, an arm carried on the upper end of said shaft and having upright guides adapted to be engaged by mechanism connected with the turret, an arm carried on the lower end of said shaft and provided with vertical rollers connected by a yoke, and intermediate mechanism whereby movement of the said arm operates the speed-changing mechanism.

4. A lathe having a work-rotating spindle, a revolubly-mounted turret tool-holder, sliding blocks mounted in guides in said tool-holder, adjusting devices for said blocks consisting of spindles revolubly mounted in cavities in the said tool-holder and having an enlarged screw-threaded portion adapted to engage a screw-threaded portion of the said blocks, rollers mounted on the lower portion of said blocks, mechanism for varying the speed of the spindle, and intermediate mechanism operated by the said rollers for controlling the said speed-varying mechanism.

5. A lathe having a work-rotating spindle, a cross-feed carriage, a turret tool-holder mounted on said carriage, mechanism for varying the speed of said spindle, and means for controlling the said mechanism, the said means comprising a crank-arm having an elongated wrist extending lengthwise of the lathe-bed, a horizontal arm engaging the said wrist, a vertical sleeve-bearing for said arm, attached to the under side of the cross-feed carriage, and means operated by the tool-

holding turret for oscillating the said arm and the said rock-shaft, and thereby operating the said speed-varying mechanism.

6. A lathe having a spindle, a cross-feed carriage a turret tool-holder mounted on said carriage, a mechanism for varying the speed of the said spindle, comprising reciprocating slides, hangers attached thereto, longitudinally-movable driving-shafts, friction-wheels attached thereto and carried by said hangers, the said wheels being adapted to rotate in contact with friction-disks, and a vertical shaft geared with the said disks, and with the work-rotating spindle; and means for controlling the said mechanism, comprising a crank-arm having a prolongation, the said prolongation being attached to one of the reciprocating slides, an elongated wrist for operating the said crank-arm, a horizontal arm adapted to oscillate the said wrist, the said arm being mounted on a vertical shaft which is journaled in a sleeve-bearing fixed to the under side of the cross-feed carriage, an arm fixed to the upper end of the said vertical shaft, and a series of rollers adapted to engage the said arm, the said rollers being fixed to radially-adjustable sliding blocks mounted in the tool-holding turret.

7. A lathe having a spindle, a cross-feed carriage, a turret tool-holder mounted on said carriage, a mechanism for varying the speed of said spindle, and means for controlling the said mechanism comprising the following parts: a crank-arm fixed to a rock-shaft extending longitudinally of the lathe-bed and journaled in bearings affixed thereto, the said crank having a prolongation extending below its axis and operatively connected with the speed-varying mechanism, an elongated wrist fixed to the said crank, a horizontal arm affixed to the lower end of a vertical shaft journaled in a sleeve-bearing which is attached to the under side of the cross-feed carriage, the said arm engaging the said wrist and being adapted to oscillate the said wrist and crank both by its own oscillation and by the movement of the cross-feed carriage, rollers attached to the said arm for the purpose of engaging the said rock-shaft, an arm fixed to the upper end of the said vertical shaft and adapted to oscillate in a horizontal plane beneath the turret, sliding blocks mounted in grooves in said turret and adapted to slide therein radially with the axis of said turret, rollers carried by said blocks, and adapted to enter and engage the said arm, and means for adjusting the said sliding blocks.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of January, A. D. 1897.

EUGENE CHILDS.

Witnesses:
A. D. HARRISON,
P. W. PEZZETTI.