No. 649,905. Patented May 22, 1900.

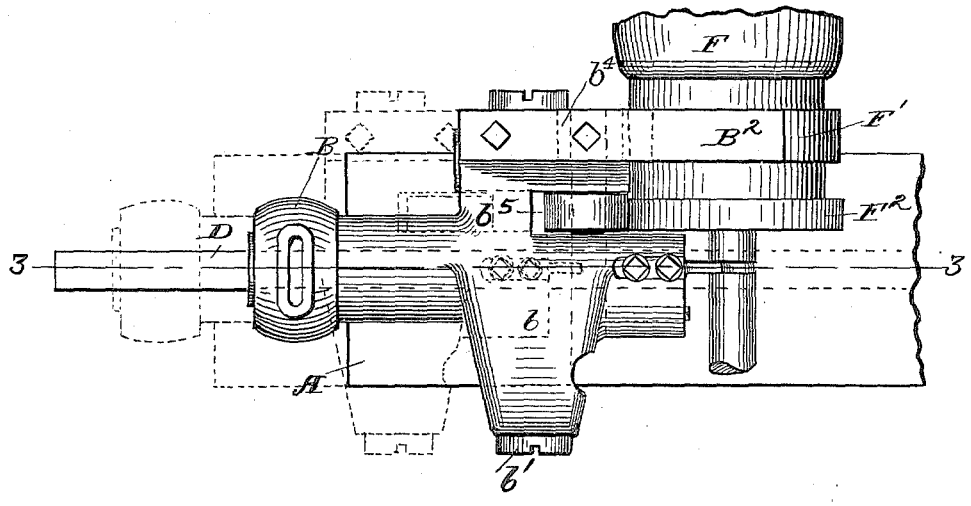
J. P. BROPHY.

AUTOMATIC LATHE ATTACHMENT.

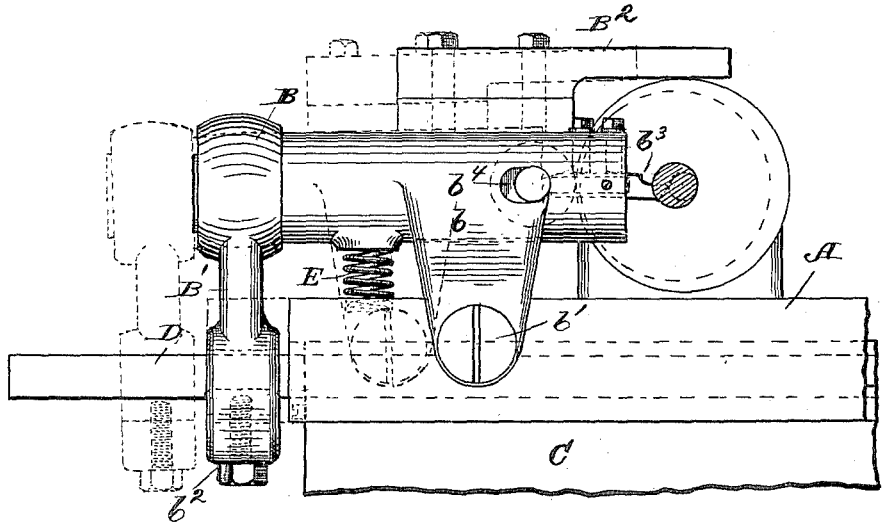
(Application filed July 17, 1899.)

(No Model.) 2 Sheets—Sheet 1.

—FIG. I—



—FIG. II—



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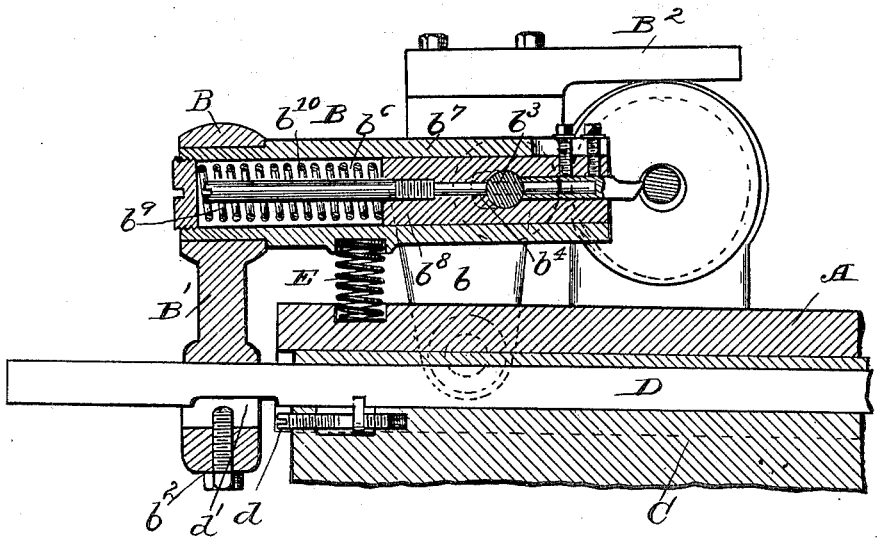
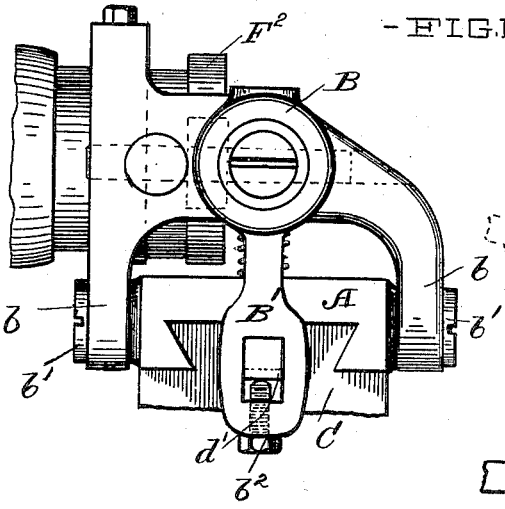
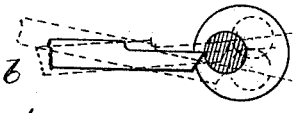
-FIG. III-



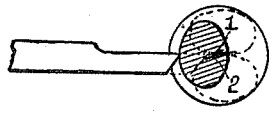
-FIG. IV-



-FIG. V-



-FIG. VI-



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UNITED STATES PATENT OFFICE.

JOHN P. BROPHY, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND MACHINE SCREW COMPANY, OF SAME PLACE.

AUTOMATIC LATHE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 649,905, dated May 22, 1900.

Application filed July 17, 1899. Serial No. 724,092. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. BROPHY, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Automatic Lathe Attachments, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to attachments for automatic lathes, and has for its object the provision of mechanism for cutting eccentric grooves in the metal blank.

The said invention consists of mechanism hereinafter fully described.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a top plan of my improved attachment, showing also the end of the head-stock of an automatic lathe and a portion of the bed or frame thereof. Fig. II represents a side elevation, Fig. IV an end elevation, and Fig. III a cross-section taken on line 3 3, Fig. I, and showing parts in elevation, of said attachment and parts shown in Fig. I. Fig. V represents a detail view showing the relation of the tool and eccentric cut on the blank during different periods of the operation, and Fig. VI a view of same during abnormal conditions.

Upon the cross-slide A of the automatic lathe is mounted a frame or tool-holder B, having two depending arms *b*, Fig. IV, formed with bearings in which are journaled two stud-screws *b'*, forming a pivot upon which said holder may be caused to oscillate.

Fixed in and projecting from the stationary bed-plate or frame C of the machine is a rod D of suitable cross-section and which is made adjustable by means of an adjusting-screw *d*, Fig. III.

Depending from and secured to the tool-holder is a yoke B', through the lower end of which the rod D passes, as shown in Fig. III. The aperture in said yoke through which said rod passes is given a cross-section to correspond with that of said rod, the latter being caused to fit snugly therein without binding, as shown in Fig. IV, by means of a screw b^2, whereby the tool-holder and the said rod may be caused to be relatively fixed transversely and relatively movable longitudinally.

Located intermediately of the tool-holder and its supporting cross-slide is a helical spring E, which urges the end of the holder opposite that end in which the tool is secured in an upwardly direction, so as to cause the said screw b^2 to constantly bear upon the lower surface of the rod D. Cut into said lower surface of said rod D is a groove *d'*, which is located in the path of the end of the screw b^2 as it slides along said rod. Said groove forms a contracted portion of the rod, which on being traversed by the said screw permits of the oscillation of the tool-holder upon its pivotal axis, as is readily understood.

Secured to the head-stock F of the lathe and rotating therewith are two eccentrics F' and F^2, eccentric relatively to the head-stock axis, but concentric relatively to each other, Fig. I.

Extending from and secured to the tool-holder is an arm B^2, adapted to contact one of said eccentrics F', as shown in Figs. III and I.

Journaled upon a rod b^3, parallel with the head-stock axis, and secured upon the tool-holder and mounted in slotted bearings b^4, Fig. II, is a roller b^5, adapted to have contact engagement with eccentric F^2, as shown in Fig. I. A bore b^6 is formed in a barrel b^7, formed upon the tool-holder, in which is located a plunger b^8, to the outer end of which the tool is secured in any suitable manner. Intermediately of the inner end of said plunger and a screw-cap in the opposite end of the bore is located a helical spring b^9, which urges the plunger, tool, and roller toward the work,

the rod b^3, upon which said roller is journaled, passing through said plunger and secured therein by means of a pin b^{10}, Fig. III.

The device operates in the following manner: The holder having been retracted from the blank, so as to cause the tool to clear the groove formed in the blank by the operation just prior to the one about to be described, the position assumed by the holder is such as to withdraw the arm B^2 from contact with the eccentric F′ and the roller from contact with the eccentric F^2, as shown in dotted lines in Fig. I, the screw b^2 at the same time being withdrawn from the groove d', as shown in dotted lines in Fig. II. On the subsequent advance of the cross-slide the holder and tool therein are advanced toward the blank and the tool caused to cut, as in the ordinary operation of an engine-lathe having an automatic cross-feed. Such advance is continued until the point is reached at which it is desired to cut an eccentric groove upon the blank. The rod D is so set that when such point is reached the set-screw b^2 drops into the groove d', and the holder is then capable of being oscillated. At the time such action occurs the eccentrics F′ and F^2 begin to engage, respectively, the arm B^2 and the roller b^5, causing the holder to reciprocate with relation to the blank once for each rotative movement of said blank and also to oscillate in a direction transverse to the direction of said first reciprocating movement once for each such rotative movement, the inward feed being continued. The reciprocation due to the action of eccentric F^2 causes the tool to advance and retract successively and uniformly toward and from the axis of rotation of the blank—that is, toward and from the center of the circle formed by a cross-section of the blank at the cutting-point. Such movement changes the center of the circle in which the metal cut by the cutting edge of the tool moves relatively to said edge and forms the eccentric. Inasmuch, however, as this tool becomes operative only when a line passing through the cutting edge and in the direction of the inward feed of the tool passes through or near the center of the circle upon which it is operating, it is seen that the motion due to eccentric F^2 alone would cause the tool to operate only part of the time, as shown in Fig. VI at 1 and 2 in dotted lines, the line of feed in such case never changing, and hence passing alternately through and on each side of the center of the eccentric circle, and such partial operation of the tool would result in cutting an elliptical instead of a circular eccentric. The introduction of the eccentric F′ corrects the movement of the tool by imparting to it a transverse oscillating movement, which continuously changes the angle of the tool to follow the eccentric center, so that the line passing through the cutting edge and in the direction of feed of the tool at any stage of the operation passes through or near the eccentric center, and the tool is hence always operative, such positions of the tool being shown in Fig. V. The above-described arrangement permits the blank or a part of a blank to be rotated upon its own or a predetermined axis, about which same axis other operations—such as boring, drilling, threading, tapping, or grooving—may be effected and an eccentric then cut—eccentric relatively to said axis—without the necessity of removing the blank from the head-stock-gripping means or even stopping the rotation thereof, thereby greatly reducing the cost of the finished article as a result of the greatly-increased output of the machine.

It is readily seen that a pure reciprocatory movement may be substituted for the oscillatory movement and the same effect produced.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means covered by any one of the following claims be employed.

I therefore particularly point out and distinctly claim as my invention—

1. The combination of a rotatable head-stock, a reciprocable and oscillatory tool-holder, and means for simultaneously reciprocating and oscillating said holder in planes transverse with respect to the axis of rotation of said head-stock and adapted to cause the time of one reciprocatory and of one oscillatory movement to be respectively equal to the time of one rotative movement of the head-stock, substantially as set forth.

2. The combination of a rotating head-stock provided with blank-gripping means, a reciprocable and pivoted tool-holder, and two eccentrics secured to said head-stock and engaging said tool-holder to respectively reciprocate and oscillate the same, substantially as set forth.

3. In a lathe attachment for automatically forming eccentrics, the combination of a cross-slide, a tool-holder supported upon said slide and capable of oscillation, means for advancing said holder, and means for oscillating the holder and for preventing such oscillation during a part of such advance, substantially as set forth.

4. In a lathe attachment for automatically forming eccentrics, the combination of a cross-slide, a tool-holder pivotally mounted upon said slide and secured to the machine-frame, a rod engaging said holder to prevent oscillation thereof during a part of the movement of the holder and formed with a depression whereby oscillation is permitted during another part of such movement, substantially as set forth.

5. In a lathe attachment for automatically forming eccentrics, the combination of a cross-

slide, a tool-holder pivotally mounted upon said slide, means for reciprocating said slide, a bar slidably engaging said holder during such reciprocation to prevent oscillation thereof, said rod provided with a depression located in the path of engagement of the holder whereby oscillation of the latter is permitted during part of the reciprocation of the slide, said rod provided with means for its adjustment in the direction of slide travel whereby the point of beginning of such oscillation may be varied, substantially as set forth.

Signed by me this 5th day of July, 1899.

J. P. BROPHY.

Attest:
D. T. DAVIES,
A. E. MERKEL.