

C. J. MONTREUIL.

APPARATUS FOR ELLIPTICAL TURNING AND BORING.

(Application filed Sept. 3, 1901.)

(No Model.)

3 Sheets—Sheet 2.

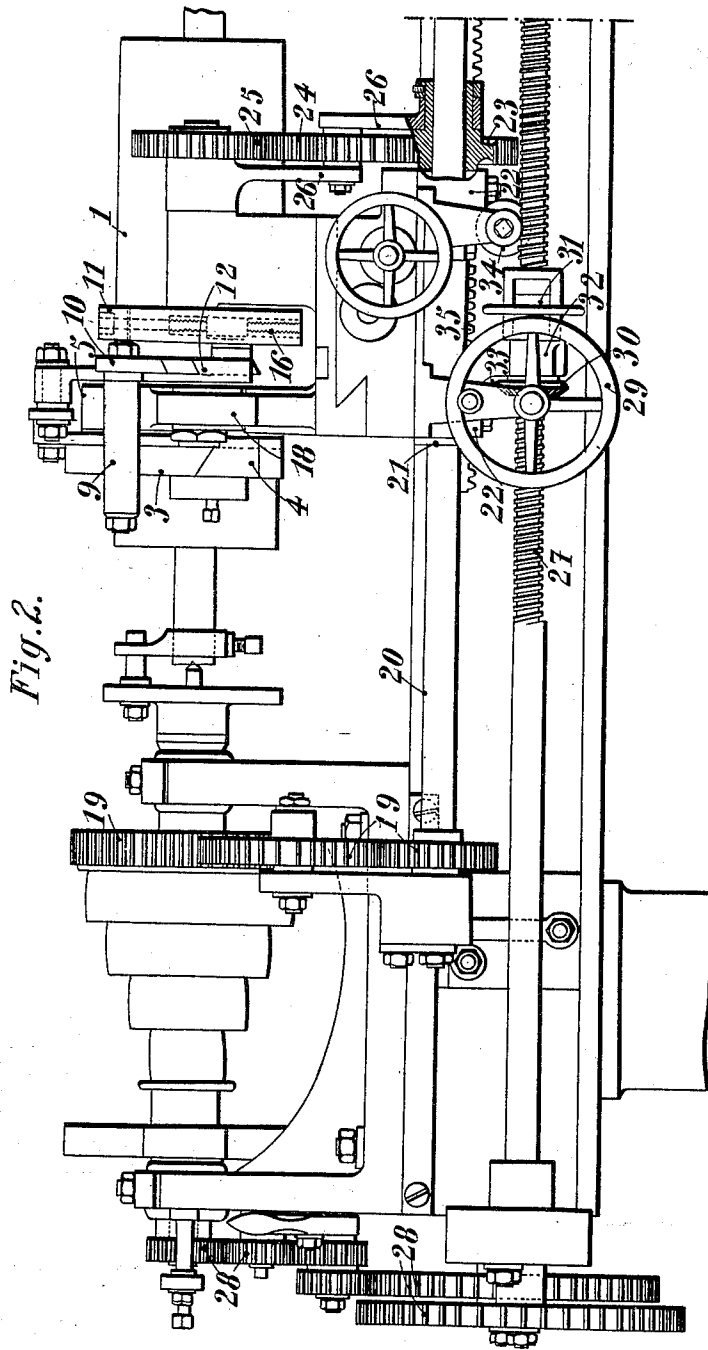


Fig. 2.

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 Atty.

No. 701,217.

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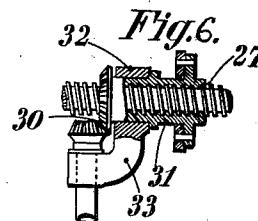
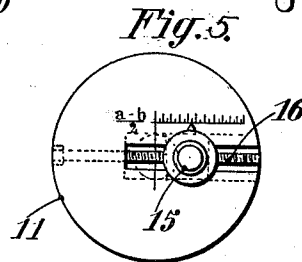
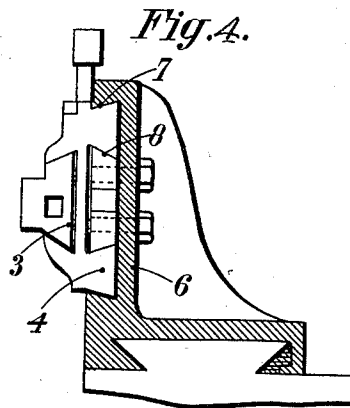
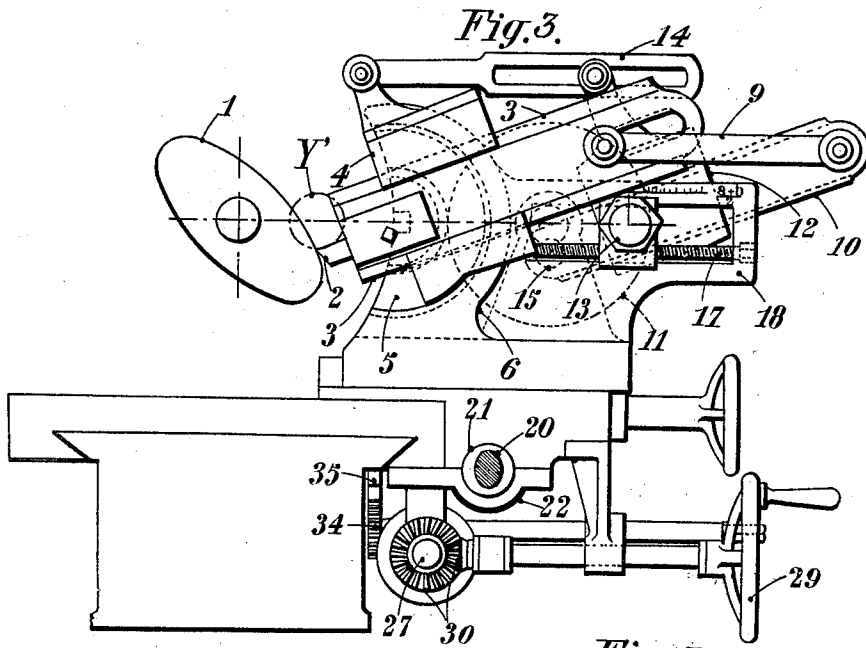
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELLIPTICAL TURNING AND BORING.

SPECIFICATION forming part of Letters Patent No. 701,217, dated May 27, 1902.

Application filed September 3, 1901. Serial No. 74,216. (No model.)

To all whom it may concern:

Be it known that I, CHARLES JULES MONTREUIL, a citizen of the French Republic, residing at Villa Camélia, Route de Trouville, Honfleur, France, have invented certain new and useful Improvements in Apparatus for Elliptical Turning and Boring, of which the following is a specification.

This invention relates to apparatus for elliptical turning and boring, intended more particularly for turning articles of elliptical form in cross-section.

In order that my invention may be fully understood, I will proceed to describe the same with reference to the accompanying drawings, of which—

Figure 1 is a diagrammatic view intended to show the principle on which the action of the tool of my improved apparatus is based. Figs. 2 and 3 represent in longitudinal elevation and in cross-section, respectively, a part of a lathe constructed and working according to this invention. Fig. 4 is a sectional detail of a portion of the lathe, showing the tool-holder, the supporting means therefor, and the arrangement for guiding the said supporting means. Fig. 5 is a plan of the crank-disk and the adjusting means therefor. Fig. 6 is a sectional detail of the lathe, showing the adjusting-screw for the slide-rest and its operating means.

Referring to Fig. 1, let OA be a straight line of a length represented by R turning around the point O, and let AB be another straight line of a length represented by r turning around the point A in a direction opposite to that of the line OA with double angular velocity of OA.

Let us suppose that the straight line OA has moved around O through an angle α and in the direction of the arrow F and that during this rotation the straight line AB has moved around the point A through an angle 2α in the opposite direction to that of the arrow F, so that the point A comes at A' and the point B at B'. It may be geometrically proven that when under these conditions the line OA has made a complete rotation around the point O the point B has described an ellipse, such as E, the semimajor axis of which is $a (R+r)$ and the semiminor axis is $b (R-r)$. It may also be geometrically proven that by

joining the point B', obtained as aforesaid, to a point O' symmetrical with O relatively to A' the straight line O' B' is a normal to the ellipse.

Let it be supposed that the ellipse E turns around the center O in the direction of the arrow F', that the points A' and O' remain stationary, and the point B' (the end of the straight line A' B') remains in contact with the ellipse. During one complete rotation of the ellipse E the line A' B' or the point B' will effect two complete rotations around the stationary point A' and for all the positions of the point B' the line O' B' is a normal to the ellipse.

Now my invention consists of having a tool-holder, such as O' B', causing the point B' of the tool to describe two circumferences around the stationary point A', while the piece to be turned is caused to effect a single rotation around its center O. From the foregoing it results that the cutting-point B' will cut a strictly-correct ellipse out of the piece turning around O, and as the direction of the tool-holder is always that of the normal to the ellipse the tool will attack the material to be turned in the best conditions.

I will now describe a practical form of turning-lathe constructed and working according to this principle, reference being first made to Figs. 2 and 3 of the accompanying drawings. The piece 1 to be turned is mounted between the loose head-stock and the tail-stock. The tool 2 is mounted in a holder 3 and is capable of sliding in a supporting piece or slide 4, which can turn in a semicircular depression 5 in a table 6 on the slide-rest. The piece 4 is guided in its movements by the inclined surfaces 7 and 8, Fig. 6. The tool-holder 3 is connected by a link 9 and connecting-rod 10 to a crank-disk 11, adjustable in a slide 12, which is capable of turning on the journal 13. Both slides 4 and 12 are connected together by a slotted rod 14 to keep them parallel. The link 9 causes the tool-holder 3 to participate in the movement imparted to the connecting-rod 10 during the rotation of the crank-disk 11.

The crank-pin 15 on the crank-disk can be adjusted in position with relation to the center of the disk by means of a screw 16, Fig. 7, so as to make r (radius of the circle de-

scribed by the crank-pin or the point of the tool) equal to

$$\frac{a-b}{2}$$

- 5 The position of the journal 13 can be adjusted by means of a screw 17 arranged inside a frame 18, integral with the slide-rest. The position of the journal 13 must be so adjusted that the distance between this journal and the center of the crank-disk 11 is equal to

$$\frac{a+b}{2}$$

- 15 In order to turn a body of elliptical cross-section of given dimensions, the positions of the crank-disk pin and of the journal 13 are adjusted as hereinbefore described. The point of the tool will then describe a circle
20 Y', Figs. 5 and 3, of appropriate radius and turn an ellipse of the dimensions required.

- The crank-disk is actuated as follows: The spindle of the fixed head-stock is connected by means of spur-wheels to a shaft 20, which
25 is elliptical or of equivalent shape on cross-section and carries a sleeve 21, capable of sliding on the said shaft 20 at the same time as it rotates between brackets 22, carried by the slide-rest. On the sleeve 21 is a toothed
30 wheel 23, Fig. 4, gearing, through the medium of spur-wheel 24, with a spur-wheel 25, keyed on the spindle of the crank-disk 11. This gearing must be so arranged that the crank-disk 11 rotates twice as fast and in the same
35 direction as the piece 1 that is operated on, so that the point of the tool describes the circle Y' twice during one rotation of the piece 1 and in the direction of the latter's rotation.

- 40 The axle of the intermediate wheel 24 is carried by two oscillating arms 26, which permit of this wheel being thrown out of gear when it is desired to turn articles of circular section.

- 45 The screw 27, which actuates the slide-rest, is driven through a set of wheels connecting the screw 27 to the spindle of the fast head-stock. The slide-rest may be traversed by turning the hand-wheel 29, which, by means
50 of the bevel-gear 30, rotates the nut 31, Fig. 8, within the sleeve 32 of the support 33, forming part of the slide-rest. By turning the hand-wheel 29 the motion of the slide may be either accelerated or retarded while the screw
55 27 is rotating, or if this screw be at rest the slide-rest may be traversed by hand.

- While the slide-rest is being traversed by the screw 27 the nut 31 is only kept stationary by its frictional bearing in the sleeve 32
60 and the resistance of the bevel-gear 30 and the fly-wheel shaft 29. If the tool should meet with a greater resistance while the slide-rest is moving, the screw 27 will cause the nut 31 to rotate, and the slide-rest will cease
65 to be traversed. The slide-rest may be likewise shifted by means of the pinion 34 and rack 35. The head-stock and the back cen-

ter may be capable of moving in a transverse direction, so as to set the piece so as to be turned to any angle. The hereinbefore- 70 described arrangement for actuating the tool could also be applied to boring-machines.

Having now particularly described and ascertained the nature of my invention and in what manner the same may be performed, I 75 declare, what I claim is—

1. In a lathe for turning articles with elliptical cross-section, the combination with the slide-rest of a table 6 having a circular depression, 5, a piece 4 turning in the said 80 circular depression a tool-holder 3 capable of sliding in the piece 4, a connecting-rod 9 and link 10 for connecting the tool-holder with the crank-pin 15 of a crank-disk 11, a slide 12 for guiding the link 10, oscillating on an adjust- 85 able journal 13, and a slotted rod 14 connecting piece 4 and the slide 12 so as to keep them parallel, this arrangement being made so as to cause the end of the tool to describe a circle the diameter of which is that described 90 by the crank-pin, substantially as hereinbefore described and for the purpose set forth.

2. In a lathe for turning articles with elliptical cross-section, the combination with a slide-rest, of a table having a circular depression, a supporting-piece turning in the 95 circular depression, a tool-holder adapted to slide in the said piece, a disk, a crank-pin therefor, a rod and a link for connecting the crank-pin with the tool-holder, an adjustable 100 journal, a slide oscillating on said journal and adapted to guide said link, a slotted rod for connecting the supporting-piece and slide, spur-wheels 19, a shaft operated by the said spur-wheels, and spur-wheels 24, 25 actuated 105 by the said shaft for operating the said crank-disk, the relative proportions of the spur-wheels 24, 25 being such that the disk turns with an angular velocity twice that of the article being turned. 110

3. In a lathe, a tool-holder adapted to have a tool suitably connected thereto, mechanism for reciprocating said tool-holder, mechanism for supporting and rocking said tool-holder in a circular manner simultaneously with the 115 reciprocation thereof, operating means for the said mechanisms, adjustable means for connecting the supporting and rocking mechanism to the said operating means for causing the operation of said mechanism and for 120 changing the degree of circular movement of the said tool-holder, and adjustable means for connecting the reciprocating mechanism to the operating means for operating said mechanism and for adjusting the reciprocating 125 movement of the tool-holder, substantially as herein shown and described.

4. In a lathe, a tool-holder adapted to have a tool suitably connected thereto, means for supporting said tool-holder to permit of the 130 operation thereof in a circular manner, mechanism for reciprocating said tool-holder, mechanism for rocking said tool-holder in a circular manner simultaneously with the re-

ciprocation thereof, operating means for the
said tool-holder, adjustable means connected
to said rocking mechanism and to said oper-
ating means for operating the former and for
5 adjusting the reciprocating movement of the
tool-holder.

In testimony whereof I have hereunto set

my hand in presence of two subscribing wit-
nesses.

CHARLES JULES MONTREUIL.

Witnesses:

LOUIS VIELOURET,
FERNAND DURERLES.