March 31, 1925. 1,531,565

H. W. MELLING

LATHE

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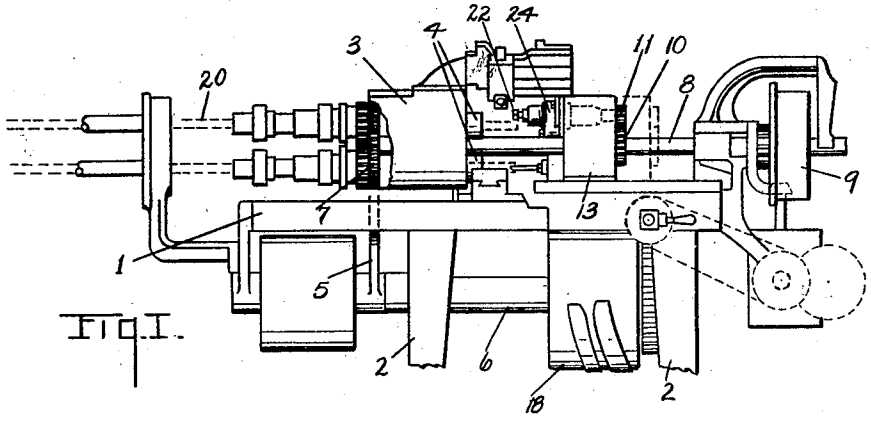


Fig. I.

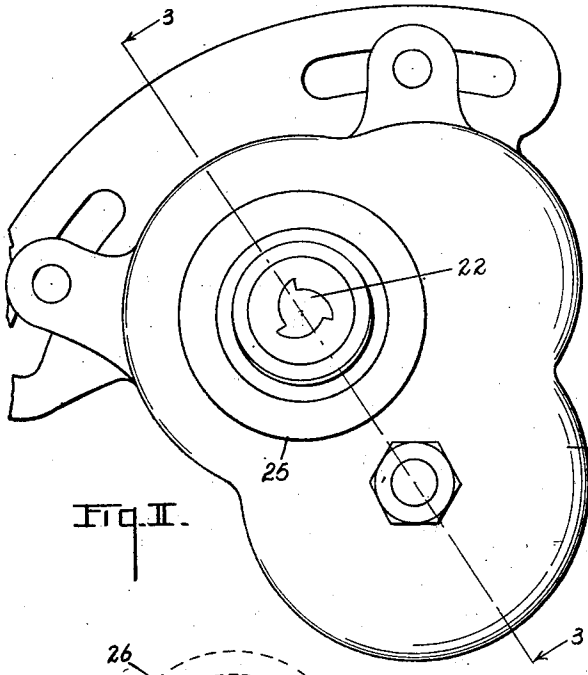


Fig. II.

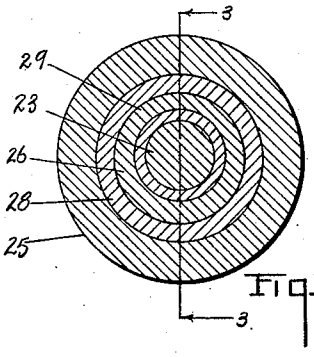


Fig. IV.

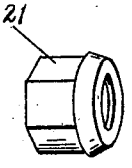


Fig. V.

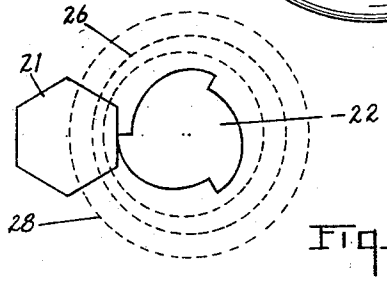


Fig. VI.

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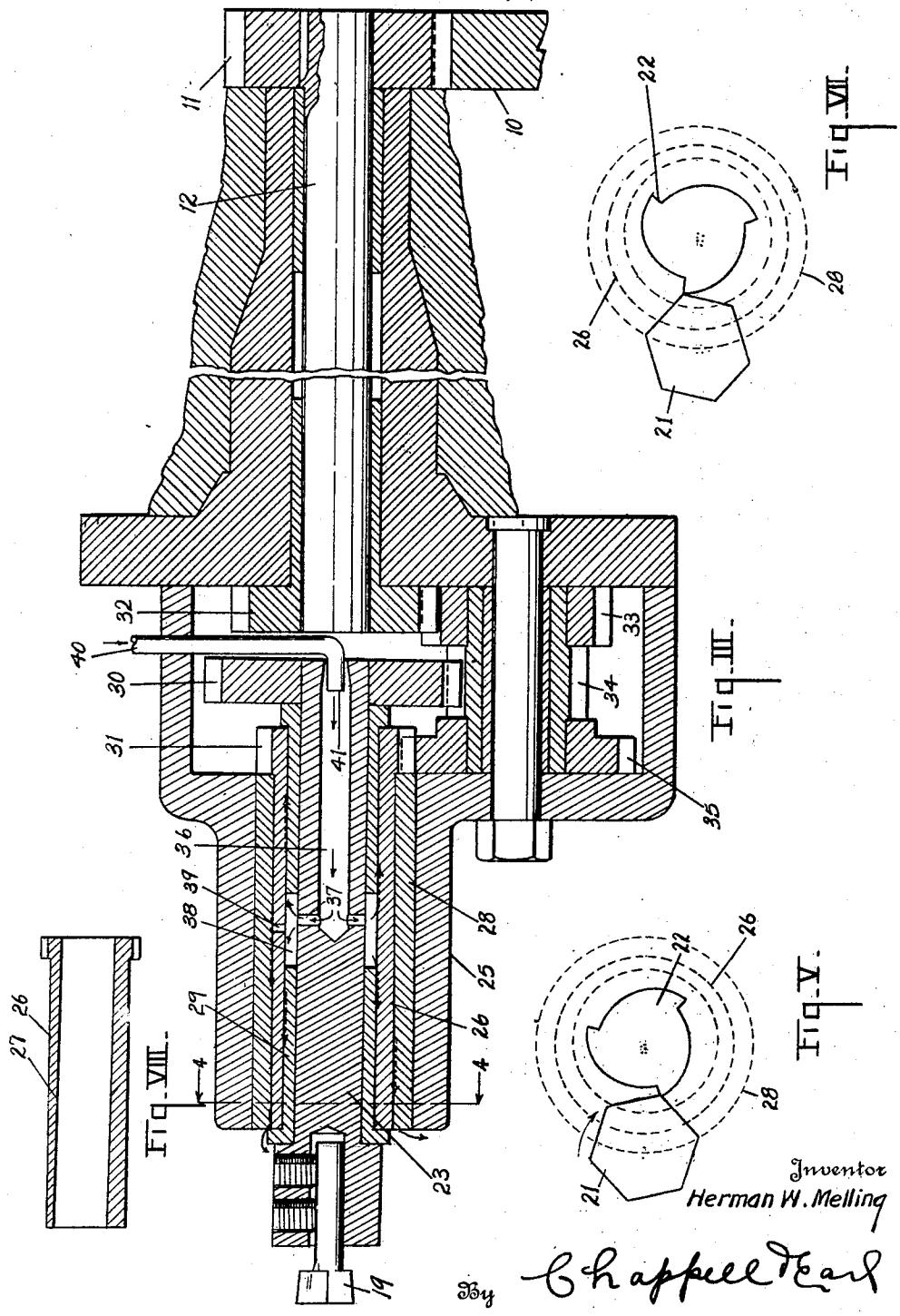


Fig. VII.

Fig. III.

Fig. VIII.

Fig. V.

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UNITED STATES PATENT OFFICE.

HERMAN W. MELLING, OF JACKSON, MICHIGAN.

LATHE.

Application filed February 4, 1924. Serial No. 690,501.

To all whom it may concern:

Be it known that I, HERMAN W. MELLING, a citizen of the United States, residing at the city and county of Jackson, State of Michigan, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

This invention relates to improvements in lathes.

The main object of this invention is to provide an improved lathe for the forming of polygonal objects such as hexagon nuts, square nuts, squared shafts and numerous other objects.

A further object is to provide an improved structure of the class described which may be readily embodied in certain types of lathes now quite generally in use.

A still further object is to provide a structure of the class described with an effective lubricating means.

Objects pertaining to details and economies of construction and operation of my improvements will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing forming a part of this application, in which:

Fig. I is a fragmentary front elevation of a lathe embodying the features of my invention, parts being shown conventionally for convenience in illustration.

Fig. II is an end view of one of the cutters and its driving means removed from the cutter carriage.

Fig. III is an enlarged detail view mainly in longitudinal section on a line corresponding to line 3—3 of Figs. II and IV.

Fig. IV is a transverse section on a line corresponding to line 4—4 of Fig. III.

Figs. V, VI and VII are diagrammatic views illustrating the relation of the tool to the work and the movement of the tool whereby a rotary cutter is adapted to cut a flat surface.

Fig. VIII is a longitudinal section of the spindle supporting member.

Fig. IX is a perspective view of the finished work of the particular embodiment of my invention illustrated herein.

In the drawing the sectional views are taken looking in the direction of the little arrows at the ends of the section lines and similar reference numerals indicate similar parts throughout the several views.

Referring to the drawing, 1 represents the bed of the machine and 2 the legs thereof. The work turret 3 is provided with a plurality of work holders 4. The turret is driven with a step by step movement from the segment 5 on the shaft 6, the segment coacting with a gear 7 on the turret.

The main driving shaft 8 is driven from a pulley 9 or other suitable source of power and is provided with a gear 10 meshing with pinions 11 on the tool spindle driving shafts 12. The tool carriage 13 is mounted in suitable ways and is moved forward by the drum 18 on the shaft 6.

These parts described, in general, form no part of my invention and are referred to to suitably illustrate a practical embodiment of my improvements. I have embodied my improvements in the accompanying drawing in a machine for manufacturing nuts, the tool carriage being provided with a plurality of tools for performing the separate operations thereon.

The particular features of my improvements as herein embodied relate to the tool 19 which is designed to reduce the stock 20 to a hexagon form or to form the polygonal portion of the nut 21. The cutter or tool illustrated has three teeth or blades 22, the nut being a hexagonal nut.

The tool 19 is supported in a spindle 23 carried by the tool carriage 13. On this tool carriage is a gear box 24 having a projecting bearing 25 for the spindle supporting member 26. This spindle supporting member 26 has a bore-like bearing 27 for the tool spindle, this bearing being disposed with its axis at an angle to the axis of the supporting member bearing.

In the embodiment illustrated the bearing 27 is centered at the inner end of the spindle supporting member 26. The bearing 25 is provided with a bushing 28 for the supporting member 26 while the supporting member 26 is provided with a bushing 29 for the spindle.

The spindle is provided with a gear 30 at

its inner end while the spindle supporting member has a gear 31. The spindle driving shaft 12 has a gear 32, the gears being disposed within the gear box 24. A gear 33 meshes with the gear 32 while the gears 34 and 35 mesh with the gears 30 and 31, respectively, the gears 33, 34 and 35 being all secured together so that they rotate as a single gear.

With the parts thus arranged the rotation of the member 26 imparts a lateral swinging movement to the tool spindle moving it to and from the axis of the work as the tool and also the work revolve. The gears 30 and 31 and 34 and 35 are of such sizes that the spindle supporting member is rotated once while each tooth is acting upon the work, thus gradually moving the tool to and from the axis of the work to compensate for the difference in the radial distance in the length of the radii of the completed work passing through the angles or intersecting the flat surfaces, the result being that a flat face is formed by each cut.

In the embodiment illustrated the work, tool spindle and the spindle supporting member are revolved in the ratio of one, two and six.

To lubricate the bearing parts I provide the tool spindle with a longitudinal lubricant passage 36 having lateral delivery openings 37 positioned centrally of the spindle. The bushing 29 is provided with a lubricant opening 38 while the member 27 has a lubricant opening 39 so that the lubricant is carried by centrifugal action to all the bearing parts and is discharged at the end of the bearings as indicated by the arrows.

The lubricant is supplied by the conduit 40 disposed between the gears 30 and 32 and having a laterally turned end 41 projecting into the passage 36.

Lathes embodying my improvements are of large capacity and may be made automatic. I have not illustrated and described various adaptations to different kinds of work as I believe the disclosure made will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. The combination with a gear box, of a driving shaft, a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle inclined to the axis of the said supporting member, such bearing being centered at the inner end of said spindle supporting member, a bearing for said supporting member, said supporting member and spindle bearings being provided with bushings, said spindle having a lubricant passage extending from its inner end and opening laterally centrally thereof, said bushing and spindle supporting member having lubricant openings therethrough, an oil supply conduit delivering to the inner end of said lubricant passage, gears on said driving shaft, tool spindle and spindle supporting member disposed within said gear box, and a train of gears connecting said gear on said driving shaft with said gears on said tool spindle and spindle supporting member.

2. The combination with a gear box, of a driving shaft, a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle inclined to the axis of the said supporting member, such bearing being centered at the inner end of said spindle supporting member, gears on said driving shaft, tool spindle and spindle supporting member disposed within said gear box, and a train of gears connecting said gear on said driving shaft with said gears on said tool spindle and spindle supporting member.

3. The combination with a gear box, of a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle inclined to the axis of the said supporting member, a bearing for said supporting member, said supporting member and spindle bearings being provided with bushings, said spindle having a lubricant passage extending from its inner end and opening laterally centrally thereof, said bushing and spindle supporting member having lubricant openings therethrough, an oil supply conduit delivering to the inner end of said lubricant passage, and driving means for said tool spindle and spindle supporting member.

4. The combination of a tool spindle, a tool carried by said spindle and provided with a plurality of teeth, a rotatable spindle supporting member provided with a spindle bearing non-concentric with the bearing of said spindle whereby a lateral movement is imparted to the spindle by the rotation of said supporting member, said spindle being provided with a longitudinal oil passage having lateral discharge openings, means for supplying lubricant to said spindle passage whereby its bearing and said supporting member bearing are lubricated, and means for driving said spindle and its said support timed so that they are rotated at a ratio corresponding to the number of teeth of the tool.

5. The combination of a tool spindle, a tool carried by said spindle and provided with a plurality of teeth, a rotatable spindle supporting member provided with a spindle bearing non-concentric with the bearing of said spindle whereby a lateral movement is imparted to the spindle by the rotation of said supporting member, and means for

driving said spindle and its said support timed so that they are rotated at a ratio corresponding to the number of teeth of the tool.

6. The combination with a gear box, of a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle disposed so that the axis of said spindle is inclined to the axis of its said supporting member, a bearing for said supporting member, said spindle having a lubricant passage extending from its inner end and opening laterally centrally thereof, said spindle supporting member having a lubricant opening therethrough to its bearing, an oil supply conduit delivering to the inner end of said lubricant passage, and driving means for said tool spindle and its said supporting member.

7. The combination with a gear box, of a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle, a bearing for said supporting member, said spindle having a lubricant passage extending from its inner end and opening laterally centrally thereof, said spindle supporting member having a lubricant opening therethrough to its bearing, an oil supply conduit delivering to the inner end of said lubricant passage, and driving means for said tool spindle and its said supporting member.

8. The combination with a gear box, of a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle inclined to the axis of the said supporting member, such bearing being centered at the center of the spindle driving gear, and driving means for said tool spindle and spindle supporting member.

9. The combination with a gear box, of a tool spindle, a rotatable spindle supporting member provided with a bearing for said tool spindle disposed so that the axis of said spindle is inclined to the axis of its said supporting member, and driving means for said tool spindle and its said supporting member.

10. The combination of a tool spindle, a rotatable spindle supporting member provided with a bearing for said spindle disposed so that the spindle is supported with its axis at an angle to the axis of its said supporting member, a cutter provided with a plurality of teeth, and means for driving said spindle and its said support timed so that the cutter is moved to and from the work while each tooth thereof is performing its cut.

11. The combination of a tool spindle, a rotatable supporting member therefor provided with a bearing, the axis of which is inclined to the axis of said supporting member, such bearing being centered at the inner end of said supporting member, gears on the inner ends of said spindle and supporting member, and a train of driving gears comprising gears meshing with said spindle and supporting member gears.

12. The combination with a tool spindle, of a rotatable supporting member therefor provided with a longitudinal bearing inclined to the axis of said supporting member, such bearing being centered at the inner end of said supporting member, and means for driving said spindle and its said supporting member at different relative speeds, all coacting for the purpose specified.

13. The combination with a tool spindle, of a rotatable supporting member provided with a bearing for said tool spindle disposed relative to said supporting member so that a lateral movement is imparted to the tool by the rotation of said supporting member, and means for synchronously rotating said tool spindle and its said supporting member.

In witness whereof, I have hereunto set my hand.

HERMAN W. MELLING. [L. S.]