J. McGREGOR & A. SNEDDON.

MULTIPLE TURNING LATHE.

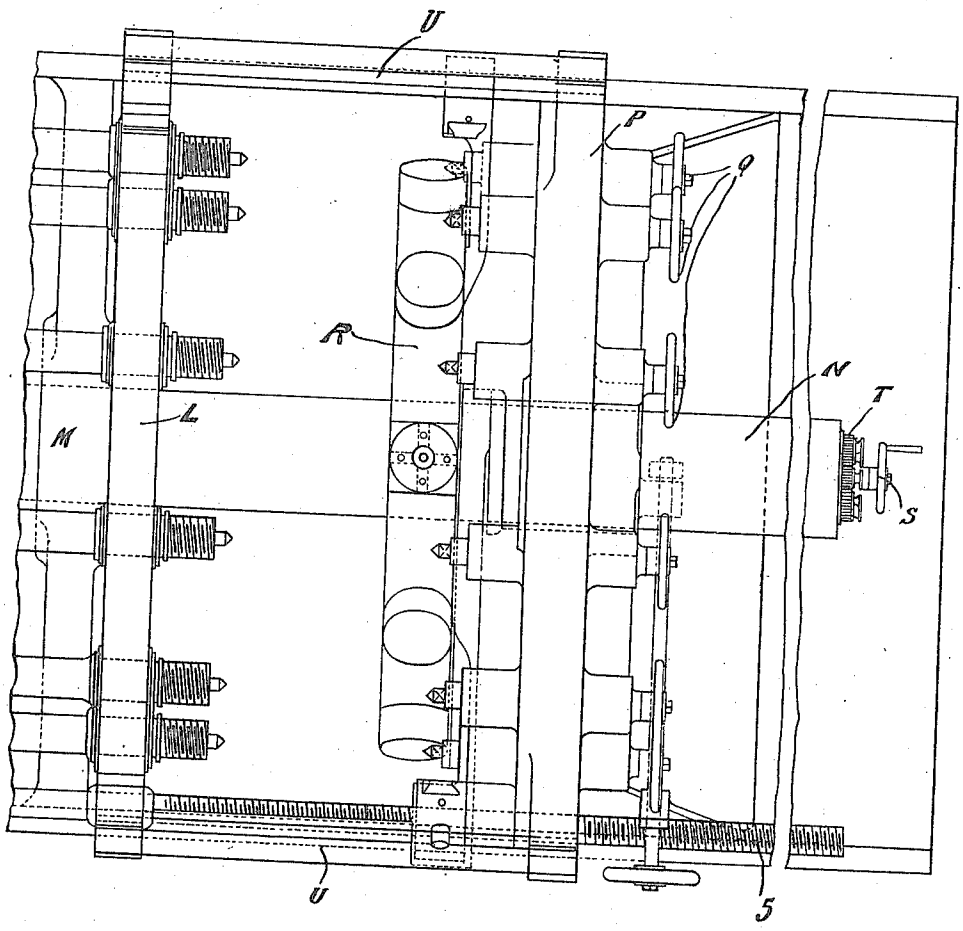
APPLICATION FILED DEC. 12, 1916.

1,264,197.

Patented Apr. 30, 1918.

3 SHEETS—SHEET 1.

FIG. 1.



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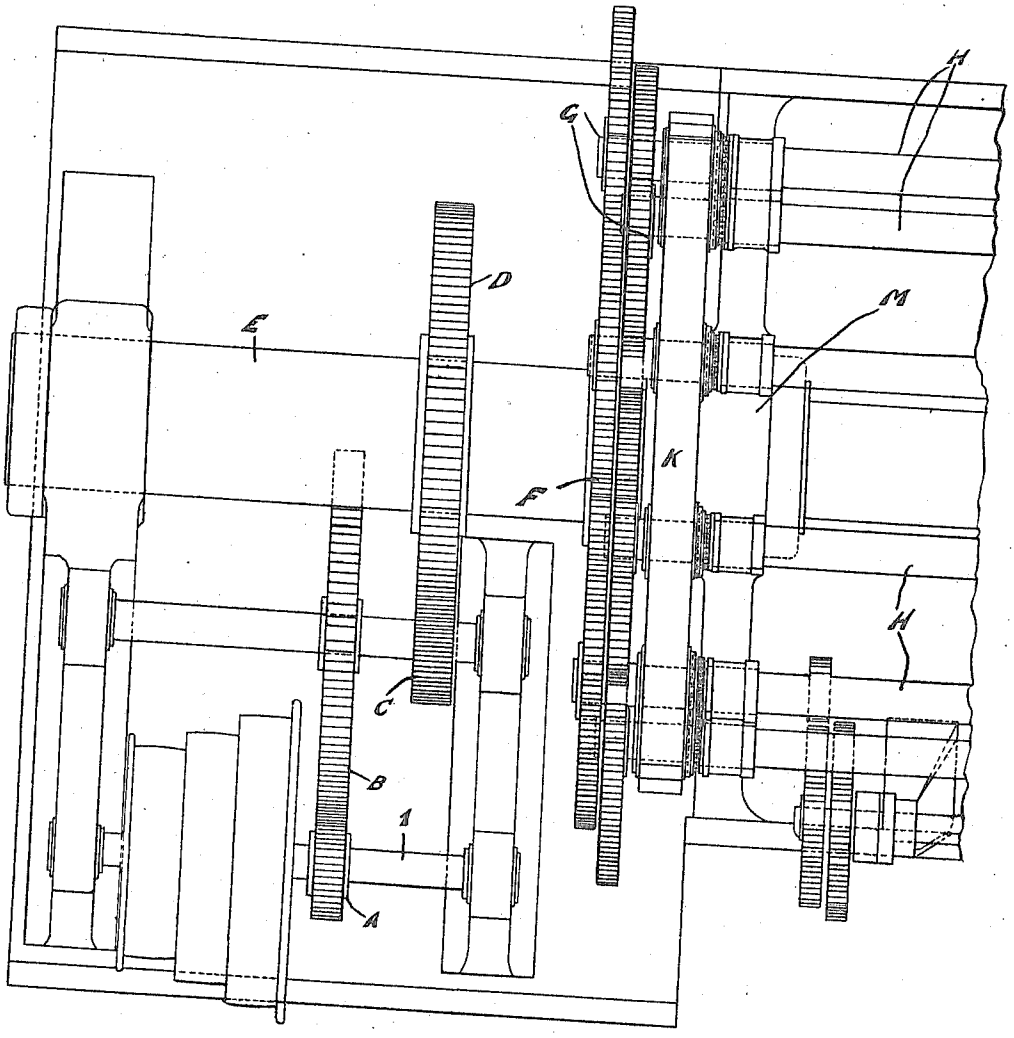
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3 SHEETS—SHEET 2.

Fig. 1.a



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3 SHEETS—SHEET 3.

Fig. 2.

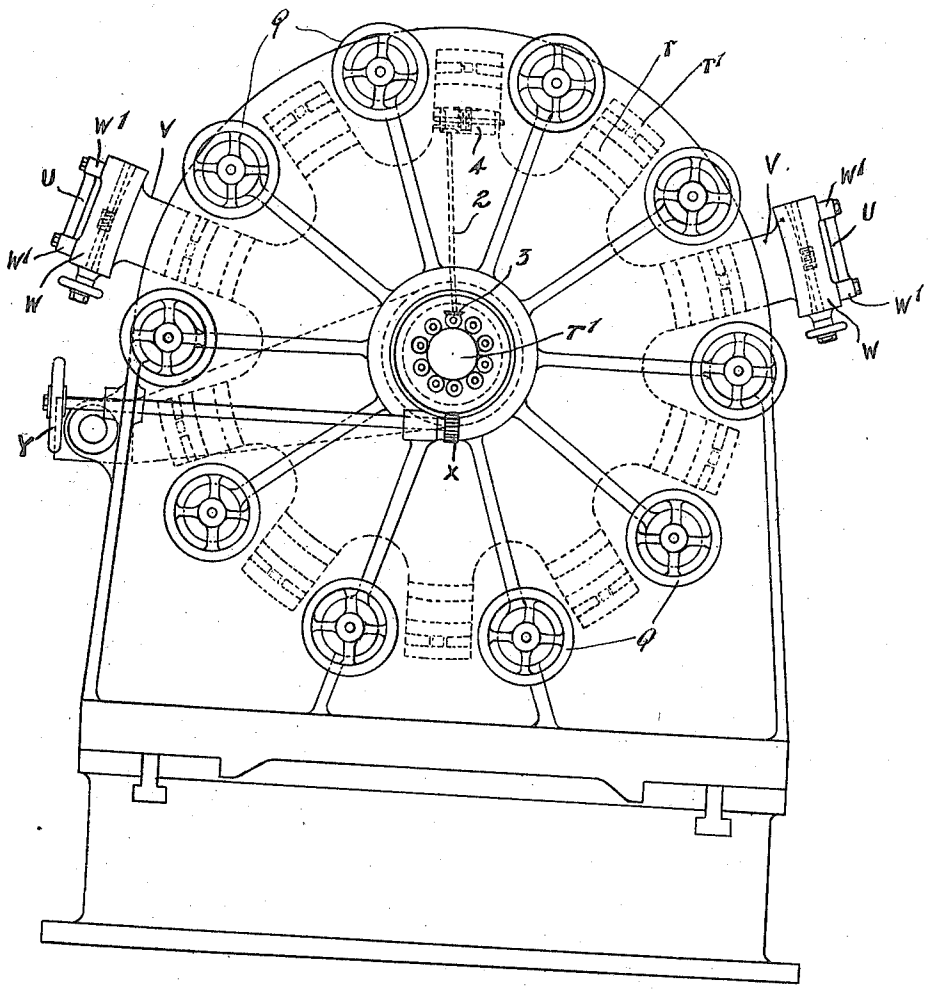


Fig. 3.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-TURNING LATHE.

1,264,197. Specification of Letters Patent. Patented Apr. 30, 1918.

Application filed December 12, 1916. Serial No. 136,414.

To all whom it may concern:

Be it known that we, JOHN McGREGOR and ANDREW SNEDDON, subjects of the King of the United Kingdom of Great Britain and Ireland, and residing in Coatbridge, Lanarkshire, Scotland, have invented a certain new and useful Improvement in Multiple-Turning Lathes, of which the following is a specification.

This invention relates to lathes for turning simultaneously a number of pieces of work, whether the generatrix of each surface turned be parallel to the axis of revolution, inclined or curved.

The invention is applicable to lathes both of the horizontal and vertical types, whether driven by belt or by independent motor.

As distinguished from prior arrangements, the invention provides a construction equipped with a multiple number of rotary spindles or drivers and with a like number of cutting tools or sets of cutting tools of which all the tools in operation for the time being are arranged to operate in the same phase; that is to say, in the improved lathe at any instant the identical operation is being effected on each piece of work, instead of the pieces of work being subjected to different stages of the complete cycle of operations of which each tool or set of tools is confined to perform one stage only.

To this end the rotary spindles or drivers, of any desired number, are mounted for simultaneous rotation in the same direction around their own axes, the centers of the spindles or drivers being concyclic and fixed in relation to the center of the common circle on which they lie, provision being made for effecting simultaneous movements of the tools.

In the accompanying drawings is illustrated one construction according to the invention as embodied in a ten-spindle lathe of the horizontal type adapted for turning ogival bodies.

In the drawings, Figure 1 and Fig. 1ª constitute a plan and Fig. 2 an end elevation of the complete lathe. Fig. 3 is a detail view hereinafter referred to.

As shown, 1 denotes the pulley or motor shaft from which the lathe is driven. A, B, C and D denote spur gears for transmitting movement from the shaft 1 to the center driving shaft E on which latter is keyed the gear D. Solid with or keyed on the shaft E is the spur pinion F meshing with spur wheels G of which one is keyed to each of the ten spindles H whereby the spindles are rotated simultaneously in the same direction. The spindles H are mounted in stationary back and front rings K and L which are securely bolted to the main head M which is also provided with bearings for the driving shaft E and for the tool-holder bar N.

The spindles H are preferably of mild steel and may be each provided with adjustable ball thrust washers for taking up end thrust, and with a screw at the forward end for attachment of the driver or chuck. The spindles H are also bored at the point and fitted with hardened steel centers.

The back head P of the lathe is provided with dead center elements of the same number as and alining with the rotary spindles H, such elements being adjustable to suit the length of the work by operation of hand wheels Q and associated screws, and being also provided with hardened steel centers similar to those provided for the spindles H. The pairs of alined centers on the back head P and the rotary spindles H are arranged in a circle corresponding to the surface of an imaginary cylinder. The back head P is also provided with a center bearing to receive the tool-holder bar N.

The heads M and P are securely bolted on to a bed plate, the back head P being adjustable to suit different lengths of work.

In the present construction the tool-holder bar N is of circular section, the tool holder R being keyed thereon, and said tool holder is free to slide through the bearings in the heads M and P to move the cutting tools from one end of each piece to the opposite end.

It is understood that the shaft E is hollow to permit the tool-holder bar N to travel the required distance of cut.

As shown in Fig. 2, the tool-holder R is provided with ten radially disposed arms, each provided with a slide-rest r and a revolving turret r' for carrying roughing and finishing tools and any other special tools which may be required in view of the nature of the work. The tools carried by the tool holder are so disposed that the line of cut of each tool will be on the surface of an imaginary cylinder.

In small machines the slide rests and turrets may be dispensed with, there being provided oppositely disposed roughing and finishing tools, the drive being reversed to bring the finishing tools into operation.

The tools are adjustable independently or simultaneously from the back end of the tool-holder bar N by means of a hand wheel S and pinions T, a pinion T' keyed to the hand wheel boss serving to impart rotation to any selected pinion T or all the pinions T, it being understood that movement is suitably transmitted to the tools from the pinions T, for example by means of spindles extending longitudinally of the bar, radial spindles 2, bevel gears 3 and worm gearing 4. Other means of adjustment may, however, be employed.

To impart to the tools the movements required in order to turn the work to the desired form, there are employed two formers U having plane or shaped surfaces, such formers being bolted between the fast and loose heads of the lathe. Fig. 3 represents a former of the shape required for turning ogival bodies. Cast on the tool-holder are projections V, one on each side of the lathe, each such projection being fitted with a slide rest W adjustable by means of a hand wheel and worm, such adjustment permitting an angular movement of the tool-holder bar to give any desired depth of cut to all the tools simultaneously. Fitted on each of the slide rests W is a pair of rollers or followers W', the rollers being arranged to track the formers U, so that as the tool-holder bar N is moved axially it is automatically angularly displaced so that the tool-holder and tools being correspondingly moved the work is turned to the required form.

In lieu of being located between the fast and loose heads, the formers might be arranged at the back of the loose head, a cross-head fixed on the end of the tool holder bar N carrying at its end rollers to engage the formers.

The desired feed is imparted to the tool-holder bar, from the screw 5 and coöperating nut, the screw being driven from one of the lathe spindles through the intermediary of change-wheels, so as to give any desired range of speed changes.

To effect quick retraction of the tools, there is cut in the tool-holder bar N a rack meshed by a pinion X on which is keyed a hand-wheel Y.

What we claim is:—

1. In a lathe, in combination, a plurality of spindles and a plurality of pairs of alined centers concentric with said spindles and located on the surface of a common imaginary cylinder, means for simultaneously rotating said spindles, a tool-holder concentric with the axis of said imaginary cylinder and confined to limited angular movement, a former determining the angular movement of the tool-holder, and normally stationary tools carried by said tool-holder and so disposed that the line of cut of each tool lies on the surface of said imaginary cylinder.

2. In a lathe, in combination, a plurality of driving spindles simultaneously rotatable around axes on the surface of a common imaginary cylinder, means for simultaneously rotating said spindles, a tool-holder arranged concentric with the axis of said imaginary cylinder and provided with arms, said tool-holder being confined to limited angular movement, pairs of oppositely directed normally stationary tools carried by said arms, and means for shifting said tool-holder angularly in either direction to bring into operation simultaneously the tools disposed in that direction.

3. In a lathe, in combination, a plural number of drivers simultaneously rotatable around axes located on the surface of a common imaginary cylinder, a longitudinally movable tool-holder confined to limited angular movement, normally stationary tools carried by said tool-holder and so disposed that the line of cut of each tool lies on the surface of said imaginary cylinder, a former for determining the angular movement of said tool-holder, and a follower carried by said tool-holder and engaging said former.

4. In a lathe, in combination, a plural number of pairs of alined centers located on the surface of a common imaginary cylinder, a tool-holder confined to limited angular movement, a former determining the angular movement of said tool-holder, normally stationary tools carried by said tool-holder and so disposed that the line of cut of each tool lies on the surface of said imaginary cylinder, means for feeding the tools in unison, and means for adjusting the tools individually or simultaneously.

5. In a lathe, in combination, a plural number of pairs of alined centers located at the surface of a common imaginary cylinder, a hollow driving shaft, an axially movable tool holder-bar accommodated in said hollow driving shaft and confined to limited angular movement, a former determining

the angular movement of said bar, a tool-holder carried by said tool-holder bar, and normally stationary tools carried by said tool-holder and so disposed that the line of cut of each tool lies on the surface of said imaginary cylinder.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN McGREGOR.
ANDREW SNEDDON.

Witnesses:
WM. TURNBULL.
THOMAS FOORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."