

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN GEAR-CUTTING ATTACHMENTS FOR METAL-LATHES.

Specification forming part of Letters Patent No. **174,596**, dated March 7, 1876; application filed January 19, 1876.

To all whom it may concern:

Be it known that I, CARL WALTER, a resident of the city of Cincinnati and State of Ohio, have invented certain new and useful Improvements in Gear-Cutting Attachments for Lathes, of which the following is a specification:

My invention comprises a simple and effective device capable of being readily applied to any lathe, so as to cut either straight, bevel, or spiral gearing, the interdental material being removed by a cutter-wheel attached to the mandrel of the lathe, as hereinafter more fully described.

In the accompanying drawing, forming part of this specification, Figure 1 is an elevation showing my gear-cutter applied to a slide-rest, the view being taken from the rear side of the lathe. Fig. 2 is an elevation showing the device set so as to cut a bevel-wheel. Fig. 3 is another elevation, showing the machine set so as to cut straight teeth or teeth parallel to the axis of the wheel. Fig. 4 is a horizontal section in the plane of the spindle, the device being shown arranged for cutting spiral gearing. Fig. 5 represents a portion of the dividing or index wheel and its accessories, and Fig. 6 is a perspective view of the spring-catch detached from the machine.

Of the above illustrations Fig. 1 is drawn on a reduced scale.

A represents a portion of the bed-plate, B the slide-rest, and C the tool-post, of a foot or power lathe of any approved construction. Adapted to be secured in said post by screw *c* is the cylindrical stem *d*, of a frame or housing, D, having a longitudinal slot, *d'*, traversed by a box, E, which is capable of being adjusted either up or down by means of the screw F and hand-wheel *f*. G is the cap that retains box E within the slot *d'*. This box is traversed at or near its mid-length by a pivot-bolt, H, that is secured in position by nuts *h* and *h'*. A collar, I, on said bolt, serves as the bearing for a hub, *j*, that projects rearwardly from a circular plate, J, whose periphery is notched at *j'*, for a purpose that will presently appear. Projecting horizontally from this plate toward the tail-stock of the lathe are two boxes, K K', that afford journal-bearings for a spindle, L, to whose front end a divid-

ing-wheel or index, M, is secured. The rear end of this spindle terminates in a socket, N, having a set-screw, *n*, for securing the shaft upon which the wheel or disk to be cut is mounted. Projecting horizontally from the box K is an arm, O, to whose outer end a block, *o*, is secured, which block has the fixed end of a spring-pawl or click, P, attached to it. The free end of this spring-pawl is adapted to engage with either of the peripheral notches *m* of the dividing-wheel M. Pivoted to the front side of block *o*, as at Q, is a spring-stop, R, carrying at one end a pin, *r*, capable of engaging with either of the apertures or indentations *m'* upon the exposed face of wheel M. These apertures or pits are arranged in circles concentric with the spindle L. Said spring-stop R has a slot, *s*, concentric with the pivot Q. S is a set-screw, which traverses the slot *s*, and securely retains the pin *r* in line with either of the concentric sets of depressions *m'*. Securely clamped between the hub *j*, collar I, and inner face of box E is a spring-plate, T, having at its lower end a spur or flange, *t*, of such shape as to engage readily with either of the notches *j'* of the plate J. The stress of this spring is sufficient to maintain the spur *t* securely in the appropriate notch, except when said spur is intentionally disengaged therefrom. Said spring may be secured to the box E by screws passing through apertures *t'*. *t''* represents a circular aperture in the spring, for the reception of pivot H. U represents a short stud-shaft, that is secured in the socket N by means of screw *n*. The outer end of this shaft is screw-threaded, and provided with a nut, *u*, wherewith the wheel V, that is to be cut, is securely attached to the spindle L of the dividing-wheel M. W represents the cutter-wheel, of any suitable size and shape. This wheel is secured to a shaft, X, that may be attached to the mandrel of the lathe in any convenient manner.

The wheel W may rotate either to the right or left, as desired.

The operation of my gear-cutting attachment is as follows: In case it is desired to cut ordinary straight teeth parallel with the axis of the wheel, the attachment is arranged as shown in Figs. 1 and 3, the spindle L being horizontal, and the cutter W located vertical-

ly under the axis of said spindle. In this position of the device the spur *t* engages with the central one of the notches *j'*, thereby preventing any rotation of the supporting-plate *J* and boxes *K K'* thereon, and, consequently, preserving the spindle *L* in a perfectly horizontal position. The wheel *V*, that is to be cut, is then secured to stud-shaft *U* with nut *u*; and said shaft is confined within socket *N* by the locking device *n*. The box *E* is now adjusted by screw *F* so as to bring the periphery of wheel *V* in its proper relative position to the cutter *W*. The latter is set in motion, and the slide carrying the tool-post *C* is shifted rearwardly, either by the ordinary screw, or else with a hand-lever. This act brings the rapidly-rotating cutter *W* in contact with wheel *V*, thereby cutting out one space from the same, after which the tool-post is retracted or drawn toward the front of the lathe. The detent *P* is liberated from the peripheral notch *m*, with which it had been previously engaged, and the index or dividing wheel *M* is turned until said detent springs into the adjacent notch, and thereby arrests any further rotation of the index-wheel. The previously-described operations of advancing and retracting the tool-post are repeated, and a second space cut out of the wheel *V*, thus forming the first complete tooth. By simply repeating these operations the entire periphery of wheel *V* is uniformly cut in the most rapid and exact manner.

The above-described operations are such as are gone through with when the teeth on wheel *V* are to correspond in number with the peripheral notches *m* of the index-wheel; but when this is not the case the detent *P* is rendered inoperative and spring-stop *R r* employed. The free end of this stop is swung around until its pin *r* is coincident with one of the concentric circles, the depressions or apertures *m'* of which correspond in number with the teeth that are to be cut on the wheel. The stop *R* is then locked in position by the screw or bolt *S*, and the act of cutting the teeth is commenced and carried on as previously described, except that the proper regulation of the dividing-wheel *M* is now effected by said stop-pin *R r*, and not by the detent *P*.

By simply providing the wheel *M* with a number of concentric sets of apertures or pits *m'* almost any desired number of teeth may be cut.

To cut out bevel-gears, the spring *T* is forced back so as to disengage its spur *t* from the notch in plate *J*, and the latter is then free to rotate upon the pivot *I*, so as to incline the spindle *L* at any suitable angle when said spur *t* is engaged with another one of the notches *j'*, so as to lock the plate *J* in its new position. The inclined wheel *V* is then brought in contact with the cutter, and a suitable bevel imparted to the teeth, as shown in Fig. 2.

To cut spiral gearing, the entire attachment is turned in the tool-post *C* so as to present the wheel *V* obliquely to cutter *W*, as represented in Fig. 4. This oblique presentation may be greater or less, with reference to the cutter, according to the angle that is to be imparted to the spiral teeth.

To form the interdental spaces with concave bottoms, so as to produce a wheel especially adapted for gearing with a worm, the reciprocating motion of the tool-post transversely of the lathe must be omitted, and the wheel *V* must be lowered vertically upon the cutter *W*, and then raised in the same manner.

If preferred, the cutting action of wheel *W* can take place while the tool-post is being retracted, as shown in Fig. 3. For cutting ordinary gear-wheels the plate *J* and its attachments may be rigidly secured to box *E*, so as not to have any angular adjustment, thereby dispensing with spring-catch *T t*. In this modification of the device the box *E*, pivot *H*, and collar *I* may be dispensed with, and the plate *J* can have a tongue adapted to slide within the slot *d'*, the adjusting-screw *F* being engaged with the upper end of said tongue.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of housing *D d'*, vertically-adjustable plate *J K K'*, spindle *L N*, dividing-wheel *M m m'*, detent *P*, or stop *R r*, as and for the purpose specified.

2. In combination with the housing *D d'*, vertically-adjustable box *E*, pivot *I*, plate *J j' K K'* and its accessories *L M m m' P R r*, the spring *T* and retaining-stud *t*, for the purpose explained.

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Witnesses:

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