W. SCHELLENBACH.

UNIVERSAL TAPER ATTACHMENT.

APPLICATION FILED OCT. 28, 1912.

1,067,137.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

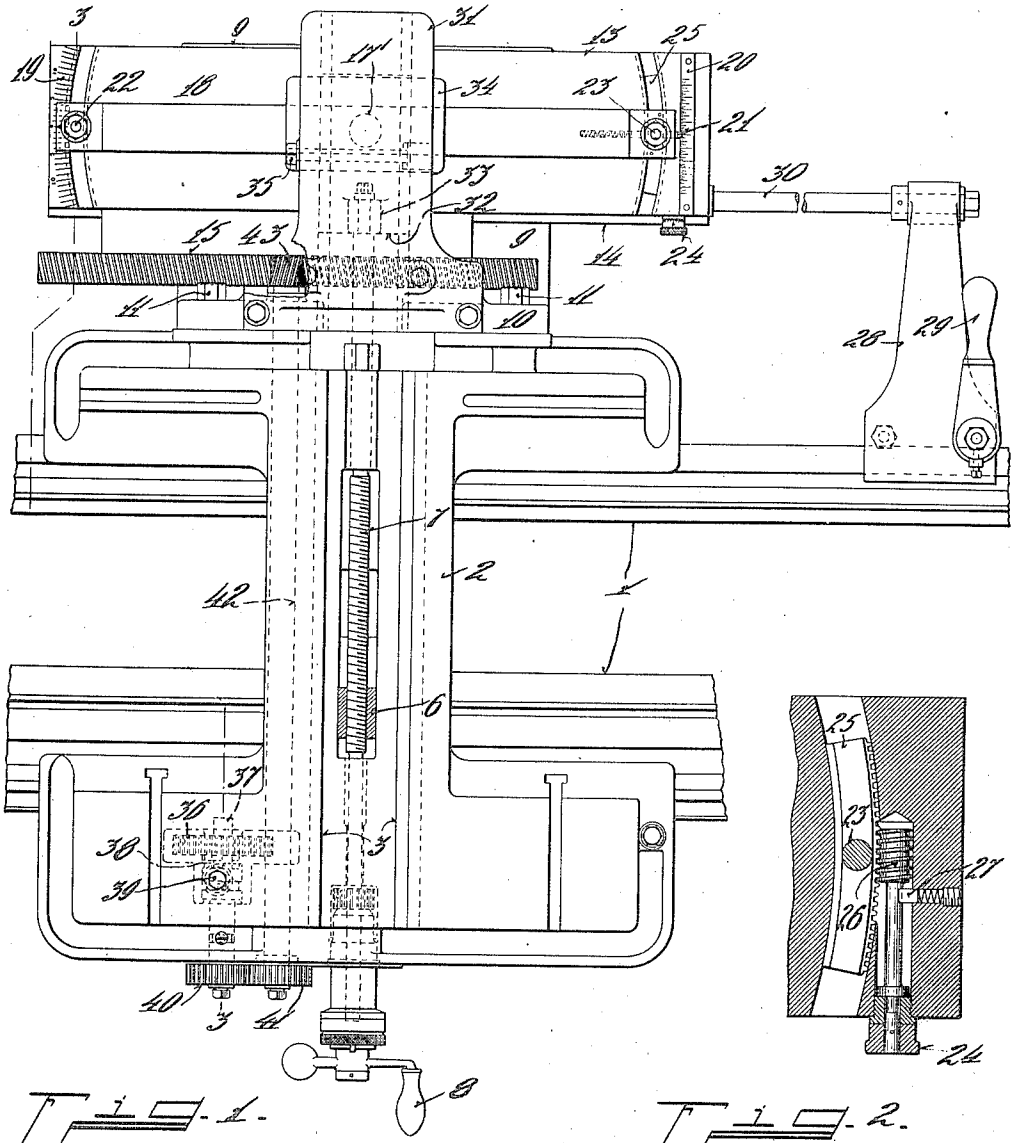


Fig. 1.

Fig. 2.

Witnesses

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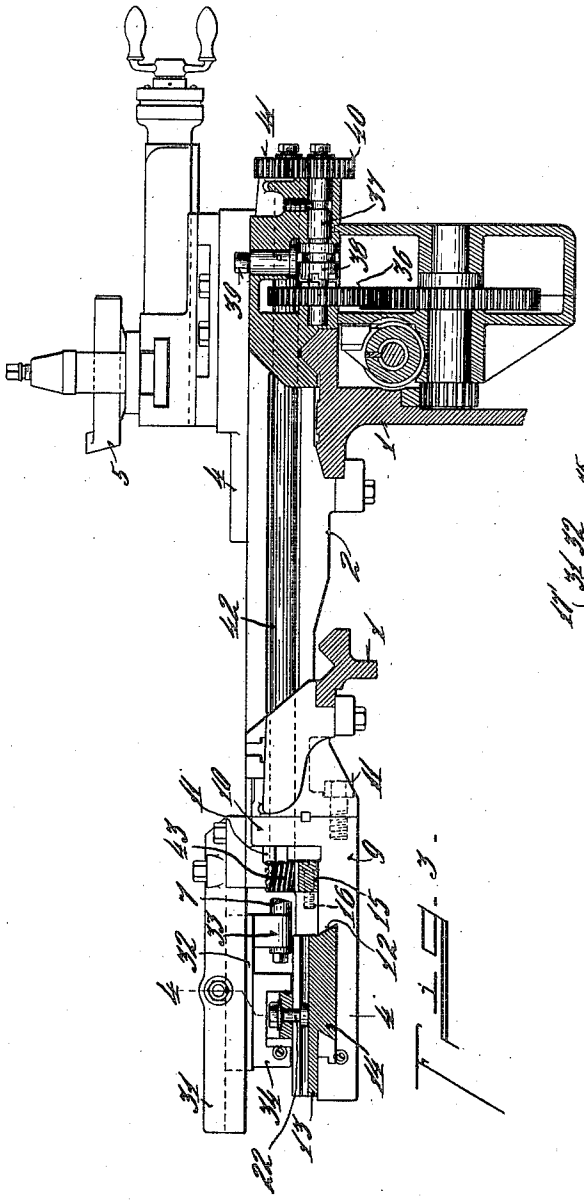


Fig. 3.

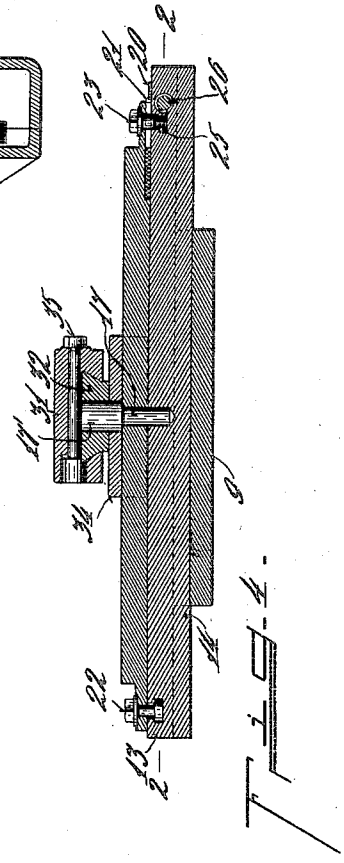


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

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UNIVERSAL TAPER ATTACHMENT.

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To all whom it may concern:

Be it known that I, WILLIAM SCHELLENBACH, a citizen of the United States, residing at Hartwell, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Universal Taper Attachments, of which the following is a specification.

This invention relates to improvements in means for turning tapers, and in a more concrete sense it is concerned with an instrumentality that may be applied as an attachment to an engine lathe to facilitate the production of tapers of various sizes and conforming to various standards.

One object within the contemplation of this invention is to render available a taper forming mechanism of a relatively simple character and so adjustable as to be in the nature of a universal instrument enabling an operator without loss of time to set the same for cutting tapers within a wide angular range.

Another object of this invention is to devise a compact arrangement in which, notwithstanding the use of a relatively short taper bar, it will be possible easily to cut tapers of a length exceeding that of the taper bar.

A still further object is to render available a taper cutting attachment for the carriage of such a character that steep tapers may be made with heavy cuts without imposing on the carriage strains tending to twist the same at an angle to the guides of the lathe bed and thus tend to develop inaccuracies in the work.

Another object is to provide an instrumentality of the character specified that embodies simple and adjustable means whereby the same may be quickly set to cut tapers accurately conforming either to the standard requiring a given number of inches or fractions thereof per foot, or accurately conforming to the standard in which tapers are expressed in terms of degrees.

Another object is to create a simple taper cutting attachment applicable for cutting long or short gradual tapers and equally applicable for cutting abrupt tapers.

Other objects will be in part outlined in the following description and in part rendered apparent therefrom in connection with the drawings hereto annexed.

In order that this invention may be made more readily comprehensible to those skilled in this art, drawings illustrating one of the many possible embodiments thereof have been appended as a part of this disclosure, and in such drawings like characters of reference denote corresponding parts throughout all the figures, of which:—

Figure 1 represents a plan view of a taper cutting attachment embodying the several features of this invention as applied to the bed of a lathe. Fig. 2 is a partial horizontal section taken along line 2—2 of Fig. 4, showing the arrangement of a micrometer adjustment, such as may be used for moving the taper bar accurately into any predetermined position. Fig. 3 is a section taken along line 3—3 of Fig. 1, showing further details of this arrangement, and Fig. 4 is a section taken along line 4—4 of Fig. 3, showing other details.

Continuing now by way of a more complete disclosure of the underlying principles and features of this invention, it may be stated that the description, while dealing largely with specific features is to be taken in an illustrative or explanatory sense, rather than in a limiting sense, inasmuch as the features of the invention may assume different forms from that shown, as will be readily comprehended by those skilled in the art in the light of this disclosure.

It will suffice to show this mechanism in connection with certain parts of an engine lathe, without entering into a detailed description of the conventional lathe elements. The bed of the lathe, having the usual guide ways formed thereon, is indicated by 1, and slidably arranged in a suitable manner on such guide ways is a base 2 of the tool carriage. This base provides a transverse slide 3 in which is mounted the part 4 that in turn, through a conventional tool post arrangement, carries the cutting tool 5. The part 4 has a depending lug 6, through which passes the screw-threaded shaft 7 forming a feed screw that terminates in an operating handle 8. It will be understood that as the work carried by the spindle of the head stock revolves through a suitable lead screw, the base 2 of the carriage is caused to slide longitudinally on the ways of the lathe bed. During a hand operation, the screw 7 is rotated without translating, and during an automatic operation it is translated without rotating. Fixed to the rear of the carriage base 2 is a casting 9 having lugs 10 through which pass the bolts 11, holding the same

in place against the edge of the carriage base 2. This casting 9 moves as a unit with the carriage. The casting 9 also provides a guide way 12 extending parallel with the guides of the lathe bed.

The traveling support for the taper bar consists of a member 13 that has a dovetailed portion 14 interfitting with the slide 12, and it extends forwardly, and has fixed thereto a rack 15 by means of the screw 16. This rack is used either when short steep tapers or long gradual tapers are to be cut, as presently will be described. Pivoted at its center to the member 13 by means of a pivot pin 17 is a taper bar 18. This taper bar is shown adapted to be swung in either direction through an angle of about fifteen degrees from a position parallel with the lathe bed guides, and means are provided whereby the angular position of this taper bar may be determined either in degrees or according to the standard expressed in so many inches per foot. Thus, at the left hand end of the member 13 is a scale 19 that is arranged in the arc of a circle with the pivot pin 17 at its center, and this scale denotes degrees, so that the taper bar 18 may be swung about to bring a suitable mark thereon in coincidence with any of the divisions of the scale, and thus insure a predetermined angularity of the taper bar expressed in degrees with respect to the guides of the lathe. This scale 19 has its zero line at a position such that it will coincide with the mark on the taper bar 18 when the latter is exactly parallel with the guides of the lathe bed, and from this point the scale reads in both directions.

At the opposite end of the taper bar there is arranged on the member 13 a scale 20 that indicates the taper in inches and fractions thereof per linear foot along the center-line of the lathe. This scale is set perpendicularly to the guides of the lathe bed, and projecting from the extremity of the taper bar is an indicator or finger 21. This finger, as shown more clearly by Fig. 4, is spring-pressed, so as always to contact with the edge of the scale 20 (*i. e.* at the ends of the divisions) irrespective of the angular position of the taper bar 18. By this means, the operator is enabled to shift the taper bar to bring the finger 21 opposite any one of the gradations on the scale, say 1½ inches from the center line, and the taper bar will therefore slant at an angle measured in terms of 1½ inches to the foot. To lock the taper bar in its angular position, after being set, the clamp nuts 22 and 23 are provided, and to enable the operator to have a more sensitive control in positioning the taper bar, the micrometer screw 24 may be utilized. This will be understood more clearly by referring to Fig. 2 in which 25 indicates a segmental rack fixed to the taper bar by means of the bolt 23. A worm 26 controlled by the micrometer screw determines the position of the rack, and a spring-pressed detent 27 may be used to hold the worm of micrometer screw against the teeth of the rack to take up back-lash and wear. The parts thus described in connection with the taper bar and the mounting therefor, will, when used in cutting gradual tapers not longer than the taper bar, be held stationary so that the carriage, together with the casting 9, will move longitudinally with respect to the same. To hold such parts stationary, a bracket 28 extends from the lathe bed and may be locked against movement thereon by means of the hand clamp 29. A bar 30 extends from the member 13 to the bracket 28, and prevents relative movements therebetween. It will shortly be explained that when short abrupt tapers or gradual tapers longer than the taper bar, are being cut, the bracket 28 is released, so that the member 13 may be caused to travel at a rate different from that of the carriage.

Bolted to the casting 9 is a top plate 31 in which normally slides a member 32 that has a depending lug 33, to which is rotatably secured the end of the feed screw 7. Pivoted to this member 32 by means of a pivot pin 17′, is a slide block 34 that slides on the taper bar 18. Thus, when the carriage feeds along the lathe bed guides, if the taper bar 18 is held stationary, or travels faster or slower, the block 34 will slide therealong, and be moved in or out according to the relation existing between the angular position of the taper bar and its movement with respect to the carriage. This results in a corresponding movement of the feed screw 7 and carries the tool into or out of the work at a rate corresponding to the setting of the taper bar 18. Should it be desired to move the tool by hand the bracket 28 is freed from the lathe bed, and the clamp nut 35 is tightened to prevent the block 32 from sliding, thus holding the feed screw 7 against translation and permitting it to be rotated by hand, so as to feed the tool as desired.

It will be observed that when the taper bar is locked to the lathe bed, it may only be used to cut tapers equal in length to that of the taper bar and having a maximum slope of about fifteen degrees from the axis, but should it be desired to cut steeper tapers of a shorter length, or gradual tapers of a greater length, the bracket 28 is freed by means of the handle 29, and gearing is used to cause the taper bar and its supporting member 13 to travel faster or slower than the carriage. To this end, there is in the apron of the carriage a gear 36 that receives motion from the lead-screw or rack in a suitable manner. This gear is loosely journaled on a shaft 37, but by means of a clutch 38 actuated through the part 39, it may be

locked to such shaft. This enables gear 40 to be revolved and in turn rotates gear 41 and the shaft 42 extending through the base of the carriage and terminating in a gear 43 that meshes with rack 15. The gears 40 and 41 are replaceable by others so as to enable the speed ratio to be varied to any extent desired. Now, when gear 43 is positively driven by the means above specified, it is evident that rack 15 will be moved relatively to the carriage, either faster or slower as the case may be, and carry with it the member 13 together with the taper bar 18. For example, the gear ratio may be set so that these parts may move faster than the carriage, and the result is that the feed screw 7 may be translated in or out at a more rapid rate than otherwise, so that the tool will move toward or away from the axis of the work at a more rapid rate, and thus cut steeper tapers.

It will thus be perceived that this invention, although of a simple character, is well adapted to achieve the objects and ends aforesaid. It will be understood that the same may be subject to considerable rearrangement and that certain parts may be used without others, without departing from the spirit of the various aspects of this invention.

I therefore claim as my invention and desire to secure by Letters Patent of the United States:—

1. A mechanism of the nature disclosed combining a bed, propelling means on one side thereof, the traveling carriage, a tool post movable on said carriage, a member located remote from said propelling means adapted to be moved relative to said carriage, means connecting said tool post with said member, and means operative through said carriage from said propelling means for moving said member at a rate different from that of said carriage when the latter travels, whereby said tool post may be moved on said carriage.

2. A mechanism of the nature disclosed combining a traveling carriage, a tool post movable on said carriage transversely to its direction of travel, a member at the rear of said carriage movable in the direction of travel of said carriage and having a slideway disposed at an angle to the direction of travel, means connecting said tool post with said slide-way whereby the former may be moved by the latter, and means extending rearwardly to said member from the apron of said carriage for moving said member at a rate different from that of the traveling carriage.

3. A mechanism of the nature disclosed combining a bed having a rack traveling carriage, a tool post movable thereon, a member movable on said carriage in a direction of travel thereof, an angularly adjustable bar on said member, a connection between the tool post and said bar whereby the latter may control the position of the former, means mounted on said carriage and intervening between said rack and member for moving said member at a rate different from that of said traveling carriage, and means for translating said carriage and connected with the latter in close proximity with said rack.

4. A mechanism of the nature disclosed combining a traveling carriage, a tool post movable transversely thereon, a member mounted on said carriage to slide thereon transversely with the movement of said tool post, a bar angularly adjustable on said member, connections between said bar and tool post, a shaft journaled transversely in said carriage and geared to said member, means adapted to be engaged with said shaft to move said member at a predetermined rate different from that of said traveling carriage, means adapted to cause said member to move as unit with said carriage, and means adapted to be engaged to hold said member stationary during the travel of said carriage.

5. A mechanism of the nature disclosed combining a traveling carriage, a member slidably mounted thereon and having a rack, a speed change gearing operative through said carriage and connected with said rack to move said member relatively to said carriage, a bar adapted to be adjusted angularly on said member, a tool post slidable on said carriage, and a connection extending from said tool post into a sliding engagement with said bar, whereby said tool post may be moved at a rate determined by the angularity of said bar and the rate of movement of said member relative to said carriage.

6. A mechanism of the nature disclosed combining a traveling carriage, clutch controlled gearing mounted at the apron of said carriage and adapted to be driven at a rate corresponding to or proportionate with the rate of travel of said carriage, a shaft extending from said gearing transversely to the rear of said carriage and terminating in a gear, a member slidably mounted at the rear of said carriage and having a rack meshing with said gear, a bar pivoted to said member and adjustable angularly thereon, a tool post movable on said carriage, and a connection extending from said tool post and terminating in a sliding fit with said bar.

7. A mechanism of the nature disclosed combining a guide bed, a traveling carriage thereon, a member slidably mounted on said carriage, gearing extending from said guide bed through said carriage to said member to move the latter at a rate proportionate to the travel of said carriage, a bar angu-

larly adjustable on said member, a tool post movable on said carriage, and means for enabling said bar to determine the position of said tool post.

8. A mechanism of the nature disclosed combining a guide bed having a rack, a carriage traveling thereon, a member slidably mounted on said carriage and also having a rack, gearing mounted on said carriage and in mesh with each of said racks, a tool post movable on said carriage, and means for enabling the movement of said member relative to said carriage to determine the rate of movement of said tool post on said carriage.

9. A mechanism of the nature disclosed combining a traveling carriage, a tool post movable thereon, a pivoted slide-bar adapted to be angled, a scale located at one end of said pivoted bar and providing a straight edge extending transversely to the direction of travel of the carriage and having equi-spaced graduations terminating at said straight edge, means carried by the end of said pivoted bar coöperating with the straight edge of said scale to enable the center line of said pivoted bar to be intersected with any of said graduations at said straight edge, and means connecting said tool part with said bar whereby the position of the former may be controlled by the latter.

In testimony whereof, I have hereunto set my hand.

WILLIAM SCHELLENBACH.

Witnesses:

OLIVER B. KAISER,

CLARENCE B. FOSTER.