2 Sheets--Sheet 1.

W. TUCKER.

Mechanisms for Cutting Screw-Taps.

No. 158,338. Patented Dec. 29, 1874.

FIG. 1.

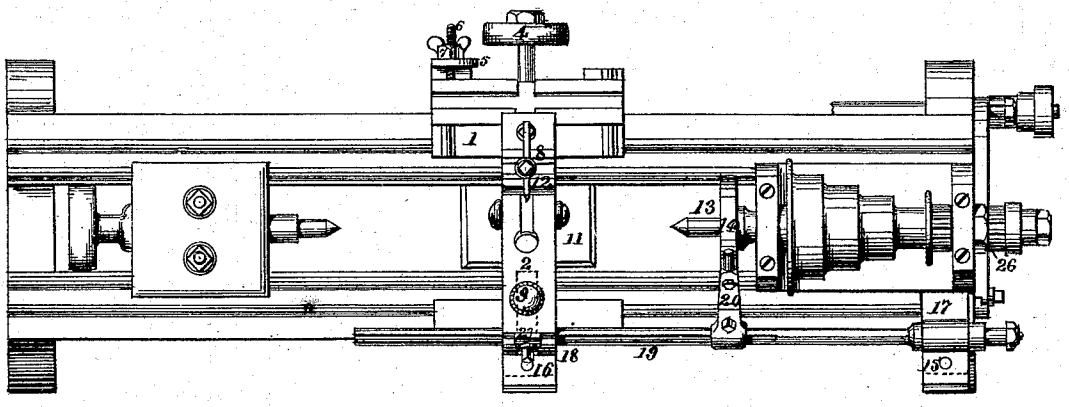
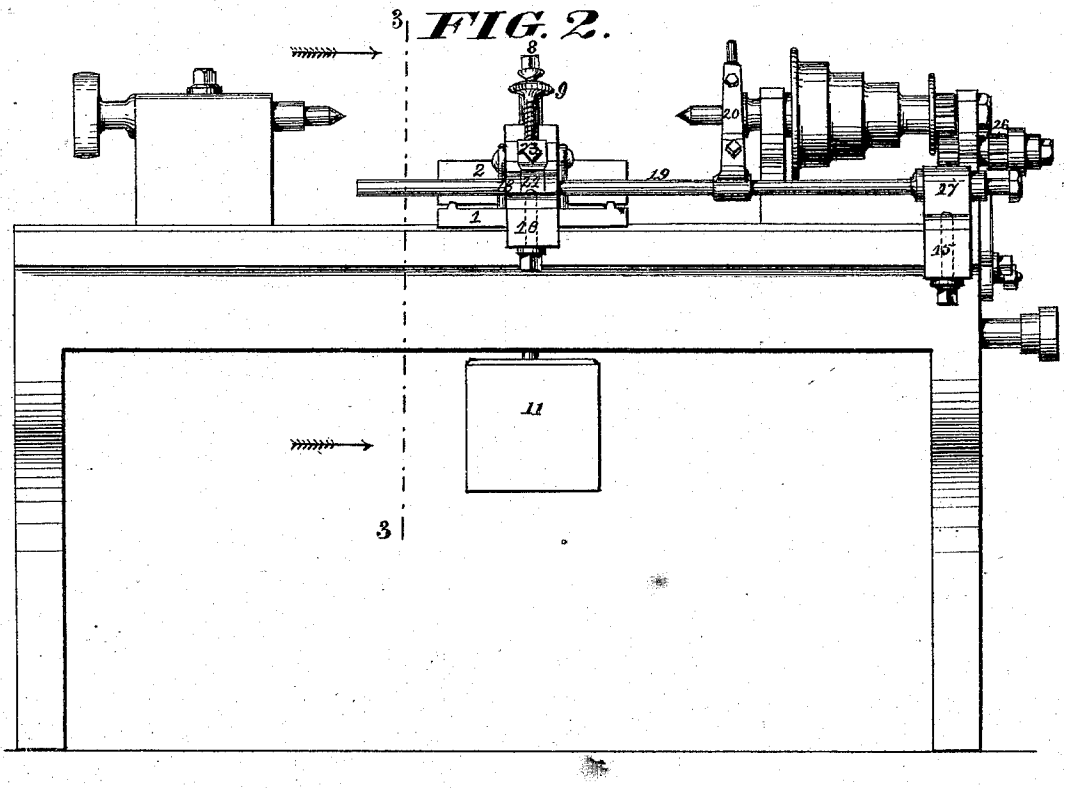


FIG. 2.



WITNESSES

Jas L. Ewin

Henry Tanner

INVENTOR

William Tucker

By Knight Bros Attorneys

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

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FIG. 3.

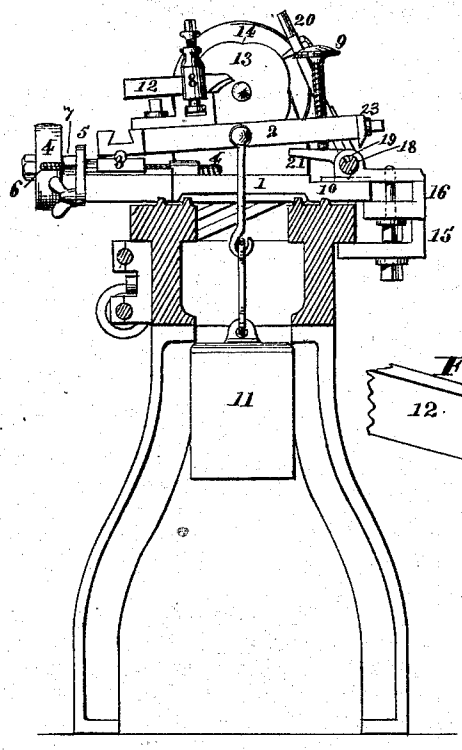


FIG. 6.

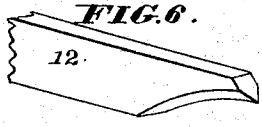


FIG. 4.

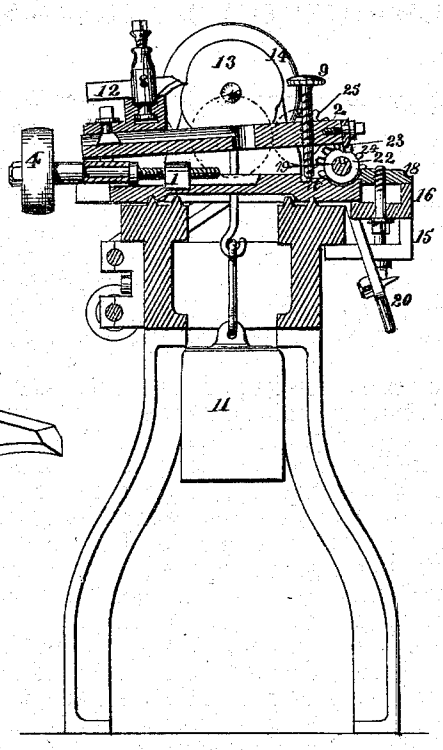
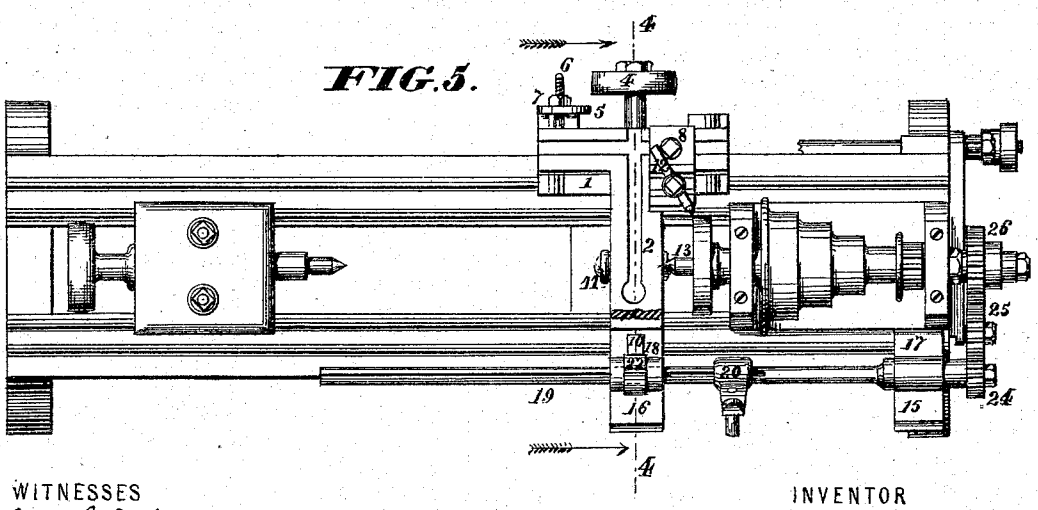


FIG. 5.



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William Tucker

By Knight Bros Attorneys

UNITED STATES PATENT OFFICE

WILLIAM TUCKER, OF FISKEDALE, MASSACHUSETTS.

IMPROVEMENT IN MECHANISMS FOR CUTTING SCREW-TAPS.

Specification forming part of Letters Patent No. **158,338**, dated December 29, 1874; application filed August 29, 1874.

To all whom it may concern:

Be it known that I, WILLIAM TUCKER, of Fiskedale, in the county of Worcester and State of Massachusetts, have invented certain Improved Apparatus for Cutting Relieved Taps, &c., of which the following is a specification:

This invention relates primarily to the adaptation of common engine-lathes to make or cut relieved taps, fluted reamers, and other articles of similar form, by means of simple attachments. The principal attachment is removable from the lathe, to clear the latter for ordinary work, and is adapted for employment, in combination with other parts, to produce, with mechanical accuracy, the pattern-cams required for the primary operation.

The present invention consists, first, in the principal attachment, hereinbefore referred to, composed of a pair of journal-brackets, adapted to be clamped, respectively, to the lathe-bed and tool-carriage, and a grooved or equivalent shaft, having collars to support it longitudinally at the lathe-bed bracket or clamp, and adapted to slide in the bearing of the other bracket, the same being adapted to receive and carry interchangeably other parts of the present apparatus, and parts of the attachments for producing pattern-cams, which constitute the subject-matter of another invention.

The invention consists, secondly, in the combination of a weighted tool-carriage, a face-plate having a pattern-cam or forms produced on or applied to its periphery, and a longitudinal rock-shaft carrying a lever-arm engaging with the pattern-cam, and a transmitting-arm engaging with the upper member of the tool-carriage, for raising and lowering the tool in correspondence with the elevations and depressions of the pattern or forms. The tool, which is by preference of a peculiar shape adapted to the work, is applied to the top of the tap or other article being turned, and is fed downward by means of the regulating-screw.

In the accompanying drawing, Figure 1 is a plan view of an engine-lathe provided with this improved apparatus, and adjusted as for cutting a relieved tap. Fig. 2 is a rear elevation of the same. Fig. 3 is a vertical transverse section on the line 3 3, Figs. 1 and 2. Fig. 4 is a vertical transverse section of the lathe and principal attachment, the latter being shown as employed in the operation of cutting the pattern or forms on the periphery of the face-plate. Fig. 5 is a plan view of the lathe as shown in Fig. 4, the plane of the latter figure being indicated by the dotted line 4 4. Fig. 6 is a perspective view of the cutter on a large scale.

Like reference figures or numbers indicate corresponding parts in the several figures.

Figs. 1, 2, and 3 of the drawing represent a weighted engine-lathe of ordinary construction, with the present attachments applied thereto.

The feed-rod and lathe-screw are not extended to the tool-carriage in the illustration, because nothing peculiar to the present invention is involved in this connection, which may be made in any usual or preferred way.

The weighted tool-carriage, which coacts in peculiar manner with the attachment, consists of upper and lower members 1 2, united at the front of the lathe by a horizontal pivot or hinge-joint, 3, and further united by a horizontal feed-screw, 4, applied, by means of collars, to the lower member of the hinge, the entire upper member of the carriage, with the hinge, being adapted to slide transversely of the lathe. A gage, composed of a hook-stop, 5, a stud-screw, 6, and an adjusting-nut, 7, provides for limiting the advancement of the tool horizontally by means of the feed-screw. A tool holder or rest, 8, is applied in a cruciform groove in the top of the carriage, and is adjusted therein for cutting tools or articles of different diameters. A vertical regulating-screw, 9, provides, in the present uses of the lathe, for feeding the tool during the cutting operation. A seat or step, 10, for this screw is provided on the lower member of the carriage, but is not always used. The weight 11 is connected centrally by links to the upper member of the tool-carriage, and operates directly to draw the same downward, so as to hold the tool 12 against the work, and the regulating-screw 9 against its seat or support. The tool 12 is of peculiar shape, as illustrated most clearly in Fig. 6, having its effective point formed by a square, or nearly

square, bevel at top, with a curved lower edge, beveled on both sides.

The lathe-spindle is provided with a face-plate, 13, having a pattern-cam or forms, 14, cut on or applied to its periphery, the same corresponding with the prominences and depressions of the relieved tap or article to be cut. The face-plate thus possesses, in addition to its ordinary functions, those of a pattern-cam. A pair of clamps, 15 16, each tightened and secured by a single set-screw, serve to attach journal-boxes 17 18 to the lathe-bed and to the rear end of the tool-carriage, respectively. These journal-boxes are in line horizontally, and receive a longitudinal shaft, 19, which, in the primary operation of the attachment, is adapted simply to oscillate. This shaft is held against longitudinal movement by tight collars at the ends of the journal-box 17, and is provided with a longitudinal groove for securing attachments thereto. To provide for raising and lowering the cutter by means of the pattern-cam 14, a lever-arm, 20, is applied to the shaft 19 at the face-plate 13, and a transmitting-arm, 21, is applied to the same shaft within a recess in the journal-box 18, so as to project beneath the regulating-screw 9. The lever-arm 20 has a clamp-socket at its lower end to receive the shaft, and a treadle-edge at its upper end to follow the pattern 14 on the periphery of the face-plate, against which it is held by the action of the weight 11 through the medium of the transmitting-arm 21. The transmitting-arm has a splined socket to receive the shaft 19, which slides longitudinally therethrough, and it transmits the oscillations of the shaft, as imparted by the pattern-cam, to the upper member of the tool-carriage, and therethrough to the tool, so as to cause the latter to rise and fall, in such manner as to produce or follow the proper curves of the corrugations, flutes, or relieved sections of the tool or article to be cut.

To preclude improper variation in the action of the respective parts, which would occur were the tool to be fed by the ordinary feed-screw 4, the tool is fed vertically, or nearly vertically, instead of horizontally, in manner as follows: The lathe-tool 12 is set by bringing the tool-stock 8 to such a position on the carriage as that, on raising or falling the vertical regulating-screw 9, the point of the tool will cut the axis of the lathe-centers. The check-nut 7 on the gage-screw 6 is then set so that the tool may be drawn backward, but not advanced farther, by means of the horizontal feed-screw 4, and the tool is then elevated by means of the vertical screw 9, so as to admit the diameter of the piece to be turned beneath it. This last-named screw now becomes the feed-screw, by turning which the tool is dropped upon the work, and the cutting is done nearly on the top of the piece, instead of on a line passing horizontally through the center of the piece or work. After cutting across the piece, in threading a tap, the tool is retracted by the horizontal screw 4 out of the partially-formed screw-thread before reversing the motion of the lathe to bring the tool back for another cut. While the lathe is running back, feed is given for a subsequent cut by the requisite turns of the vertical screw. Thus the tool is gradually lowered on a slightly-curved line, cutting the axis of the centers of the lathe.

In order to secure perfect work in the lathe by means of these attachments, the necessity of a perfect outline in the pattern-cam 14 on the face-plate is apparent, the several depressions or forms requiring to be perfectly equidistant and otherwise alike.

Apparatus for producing these multisimilar depressions or forms on one and the same face-plate agreeing to a single given pattern is the subject-matter of another invention, illustrated in part in Figs. 4 and 5.

Referring to these figures, 22 represents a generating-cam substituted for the transmitting-arm 21, Figs. 1–3. 23 represents a treadle-edge to engage therewith; and 24 25 26 represent gearing connecting the shaft 19 with the counter-spindle, by which the feed-screw is driven, of which gearing the tight wheel 24 is applied to the projecting end of the shaft 19, which is adapted to rotate by loosening the lever-arm 20, and by the substitution of the pattern-cam for the transmitting-arm.

The following is claimed as new in this invention, namely:

1. The attachment for weighted engine-lathes herein shown and described, composed of the clamps 15 16, the journal-boxes 17 18, and the longitudinal grooved shaft 19, constructed and combined substantially as specified, the latter being held against longitudinal displacement at the journal-box 17 by tight collars, and the journal-box 18 being recessed and adapted to slide on the shaft, for the purposes set forth.

2. The combination of a weighted tool-carriage, a face-plate, 13, having a pattern-cam or form, 14, produced on or applied to its periphery, and a longitudinal rock-shaft, 19, carrying a lever-arm, 20, engaging with the pattern-cam, and a transmitting-arm, 21, engaging with the upper member of the tool-carriage, for raising and lowering the tool in correspondence with the elevations and depressions of the pattern or forms, substantially as herein illustrated and set forth.

WILLIAM TUCKER.

Witnesses:

G. N. BACON,

E. L. BATES.