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STYLUS MOUNTING FOR REPRODUCING AND ENGRAVING MACHINES

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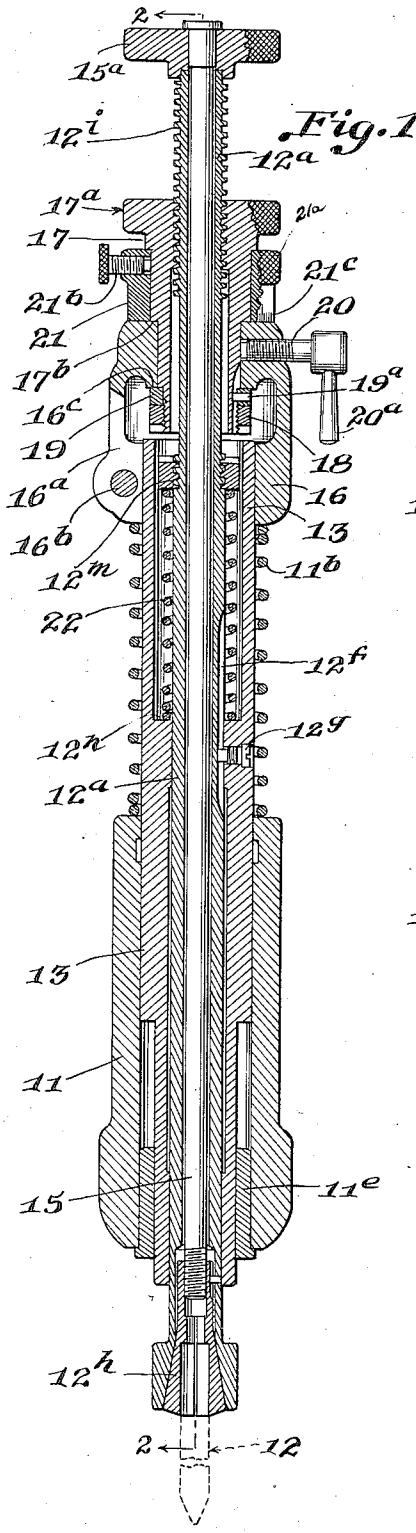


Fig. 1.

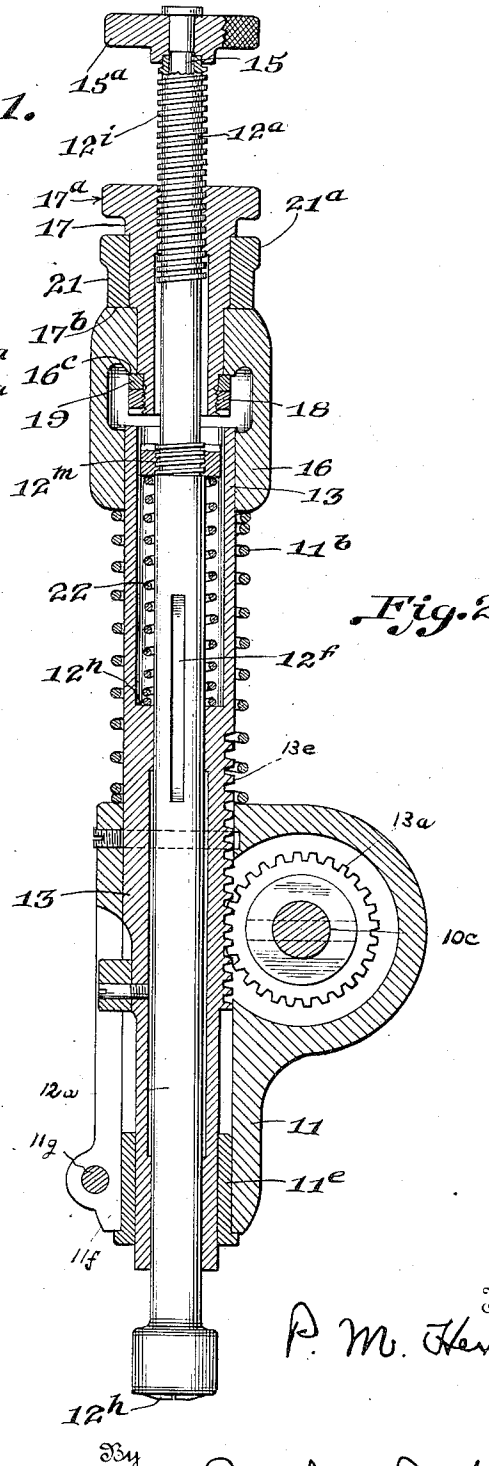


Fig. 2.

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STYLUS MOUNTING FOR REPRODUCING AND ENGRAVING MACHINES

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8 Claims. (Cl. 90—62)

This invention relates to certain improvements in stylus mountings for reproducing and engraving machines; and particularly concerns tracing stylus mountings for duplicating, reproducing and engraving machinery or other apparatus to which my invention is applicable or to which it can be in some embodiments adapted; and the objects and nature of the invention will be clear to those skilled in the art from the following description of the accompanying drawing illustrating the preferred mechanical expression or embodiment of the invention from among other forms, constructions and arrangements within the spirit and scope of the invention.

An object of the invention is to provide a mounting for the tracing stylus of reproducing machinery and other apparatus to which the mounting can be adapted, whereby the stylus can be more accurately adjusted and held than in prior devices known to me, and wherein rotation of the stylus spindle during adjustment and/or operation is avoided.

A further object of the invention is to provide certain improvements in combination, arrangement and organization with the end in view of producing an improved and highly desirable tracing stylus mounting.

With the foregoing and other objects in view, my invention consists in a novel organization of associated elements or features and in certain combinations as more fully explained and specified hereinafter.

Referring to the accompanying drawing, forming a part hereof:—

Fig. 1 shows in part a duplicating or reproducing apparatus in vertical longitudinal section, say the apparatus of Patent No. 2,005,696 issued June 18, 1935 to George Gorton Machine Company, Racine, Wisconsin, as assignee, having an embodiment of my instant invention applied thereto and included therein.

Fig. 2 shows in part the apparatus of Fig. 1 in vertical longitudinal section in a vertical plane approximately perpendicular to the vertical plane of the section Fig. 1.

The function performed by a tracing stylus in reproducing work or in a machine tool of the duplicator type, is well illustrated by the hereinbefore identified patent. In heavy duplicating or reproducing work or where a high degree of accuracy is required, it is important to provide for accurate stylus adjustment with means to accurately maintain the desired set relative positioning and forms of the cutter and stylus, and it is also desirable to maintain the stylus against turning or rotation on its longitudinal axis both after and during stylus adjustment. Sometimes a stylus and/or its carrying barrel and/or its collet, will not be perfectly true, will be slightly eccentric or off center, and if finally adjusted and set in the desired accurate position with respect to the cutter and/or the pattern, rotation thereof will bring about inaccuracy and/or multiply the same, and thereby result in objectionable inaccuracy in the work.

The present invention provides an organization for vertical adjustment of the stylus and its barrel without rotation, and/or turning thereof on its longitudinal axis, and also otherwise provides a highly desirable and advantageous stylus mounting.

Using the machine disclosure of said patent as an example, any suitable supporting housing, such as 11, is provided for the tracing stylus barrel 13. This housing maintains the lateral spacing between the stylus support or head and the machine cutter head, as well as the longitudinal axes of the cutter and stylus in parallelism and in this example vertical. This housing 11, provides a vertical tubular portion having a vertical bore or slideway in which the tubular stylus-carrying barrel 13, is vertically slidable, and is held against rotation or turning on its longitudinal axis. If so desired, the lower end portion of the tubular housing, can be provided with a normally fixed internal bearing bushing 11*e*, through which barrel 13, is slidable and is preferably held against objectionable lateral play. If so desired, the lower end portion of the vertical tubular portion of said housing can be formed with a longitudinal slot, to constitute a split clamp 11*f*, with a clamping screw or bolt 11*g*, for contraction on the bushing 11*e*, if so desired, to rigidly hold the same, although my invention is not so limited.

Any suitable organization is provided for feeding the barrel 13, and the stylus, longitudinally toward and from the pattern and for holding the stylus to the pattern during a tracing and reproduction operation. For instance, the means for this purpose can be approximately the same as illustrated in said patent, and where such means are employed, the stylus carrying barrel 13, is provided with a longitudinal rack 13*e*, in mesh with a toothed gear or pinion 13*a*, fixed on transverse rotary shaft 10*c*, mounted in the housing 11, and operatively coupled to the feed shaft for the cutter spindle, preferably in such manner that the cutter and stylus will be simultaneously fed toward and from the work and the pattern and can be manually held thereto. The shaft

10c, and pinion 13a, are shown housed in the supporting casing or housing 11.

The tracing stylus spindle 12a, is straight and longitudinally elongated and extends through the barrel 13, projecting above and below the same, and is concentrically arranged therein for adjustment on its longitudinal axis longitudinally of said barrel, but is held in said barrel against rotation or turning on its longitudinal axis by any suitable means, for example by pin or key 12g, normally rigid with the barrel 13, and slidably fitting in longitudinal key way 12f, in the spindle.

The lower end of the stylus spindle 12a, is provided in any suitable manner for stylus removal and replacement, and to normally rigidly hold the stylus 12, in longitudinal alinement with the common axis of the spindle and barrel. In the particular example illustrated, the spindle is tubular with a central concentric bore, tapered at its lower end, to longitudinally receive the contractile stylus holding collet 12h, while the collet clamping and controlling rod or shaft 15, is at its lower end united by screw threads to the collet in the usual or any other suitable manner, and extends therefrom throughout the length of the spindle and beyond the upper end thereof, is provided with the usual rod rotating wheel or handle 15a.

The upper end of the longitudinally extended barrel 13, is provided with a longitudinally tubular head 16, normally rigid with said barrel and constituting an upward longitudinal extension thereof.

This head 16, forms an annular shoulder or abutment surrounding the barrel end, for the upper end of expansion coiled spring 11b, surrounding the barrel and more or less compressed between the top end of casing or housing 11, and said shoulder, mainly for the purpose of taking up slack between the teeth of the pinion 13a, and the barrel rack, although I do not wish to so limit my invention.

The lower end portion of head 16, is preferably longitudinally split, see 16a, to constitute a split clamp, for contraction, and release for expansion, by clamping bolt or screw 16b, whereby the head is normally rigidly clamped on the upper end of the barrel, and can be removed therefrom and applied thereto, and adjusted longitudinally thereof if required.

The non-rotary spindle projects from the upper end of the barrel and extends longitudinally through head 16, and to a point above the same, and is longitudinally slidable therethrough for adjustment purposes.

The head 16, and the spindle are normally locked together against relative longitudinal movements, to move longitudinally together as a unit when propelled by the feed means hereinbefore described and the spring 11b. However, means are provided for longitudinal sliding adjustment of the spindle in and relative to the barrel and its head 16, while said spindle is held and maintained against rotary or turning movement on its longitudinal axis. For example, this relative adjustment of the spindle along the longitudinal axis of the barrel, is preferably performed by a screw threaded connection between the spindle and a rotary nut held to the barrel, preferably the head 16, against relative longitudinal movement. In the example shown, the upper end portion of the spindle is provided with an exterior longitudinal screw threaded portion 12i, extending longitudinally into a tubular nut 17, and in mesn with the internally screw threaded portion of the bore of said nut. This nut is formed by a longitudinally elongated rotary sleeve or collar mounted in the head 16, against relative longitudinal movement and concentric with the barrel and spindle. The nut 17, as shown, is formed with an exterior accessible annular handle or finger hold 17a, by which it can be rotated and actuated. This nut preferably projects longitudinally upwardly beyond the head 16, and depends in the upper end of the head, the nut and the complementary internal wall of the head, providing cylindrical bearing surfaces that center and provide for rotation of the nut, as well as horizontal slidably engaging annular abutting shoulders 17b, of the head and nut, limiting the downward movement of the nut within the head. The nut is confined against relative upward movement in the head by suitable means. For instance, the reduced lower end of the nut is longitudinally screw threaded, and a retaining nut 18, is screwed thereon, to retain washer 19, on said end of rotary nut 17, and against downwardly facing internal annular transverse shoulder 16c, of the head 16. The ring washer 19, is preferably confined to nut 17, to rotate therewith by pin 19a, entering a longitudinal exterior key way in said lower reduced end of nut 17.

The adjusting nut 17, is thus journaled in the head 16, for rotation on the longitudinal axis of spindle 12a, while held against relative longitudinal movements by the shoulder of nut 17, overhanging and resting on internal horizontal shoulder 17b, of the head, and ring 19, confined to the adjusting nut and bearing up against internal horizontal shoulder 16c, of said head.

Suitable means can be provided, if so desired, to rigidly lock the adjusting nut 17, to and against accidental rotary movement in head 16, after an accurate adjustment of the stylus spindle 12a, has been made. For instance, I show a rotary clamping screw 20, for this purpose, having exterior accessible rotating means 20a. This screw extends through and meshes with the thread of a radial hole in the head 16, so that the screw can clamp against a cylindrical portion of nut 17, to lock or release said nut.

The dimensions and characteristics of the screw threaded connection between spindle 12a, and adjusting nut 17, are preferably such that accurate micrometer adjustments of the spindle can be made. It is also to be noted that the screw threaded connection with said spindle by which said spindle is longitudinally adjusted, is self locking in that the spindle is thereby locked in the longitudinal position to which adjusted, so long as rotative movement of the adjusting nut does not occur.

I preferably provide means whereby the spindle can be accurately adjusted to and set at a predetermined measured longitudinal distance. For instance, I show exterior collar or sleeve 21, concentric with adjusting nut 17, and centered and relatively rotative on a cylindrical portion of said nut above head 16, with the bottom edge of collar 21, slidably contacting the flat annular top edge of head 16. This collar is preferably provided with exterior annular means, such as 21a, forming a finger hold or handle by which the collar can be moved rotatively on the adjusting nut. Said collar is also preferably provided with an accessible rotary clamping screw 21b, by which the collar can be clamped to the adjusting nut for rotary movement therewith, or can be released for rotative movement on the nut. The circumference of the collar 21, is provided with a vis-

ible circumferential scale 21c preferably graduated in thousandths of an inch or more, for reading with an associated index mark (not shown) visible on the exposed top portion of head 16, adjacent the bottom end of the collar. The scale graduations indicate the distance the spindle will be adjusted vertically by rotation of the adjusting nut to carry the collar the distance from one graduation to the next graduation. Thus, if the spindle is to be adjusted a predetermined distance, the clamping screw 21b, is loosened and the collar is rotated backwardly the said predetermined distance as indicated by the scale graduations and the fixed index, and the collar is then clamped to the nut to rotate therewith. The adjusting nut 17, is then rotated forwardly carrying collar 21, with it, the same distance that the collar had previously been moved rearwardly, until the graduations for which set, have passed the fixed visible index, thereby adjusting the spindle 12a, vertically the distance indicated by the collar graduations.

If so desired spring means can be provided to take up any possible slack or looseness between the adjusting screw thread connection between spindle 12a, and rotary adjusting nut 17. For instance, I show expansion coil spring 22, within the barrel 13, and surrounding the spindle 12a, and compressed between annular internal transverse shoulder 12n, of the barrel, and collar 12m, normally fixed on the spindle 12a.

What I claim is:—

1. In apparatus of the character, substantially as described; a non-rotary tracing stylus spindle; a non-rotary barrel carrying and concentric with said stylus spindle; and means whereby said barrel and spindle are normally locked together and feedable longitudinally as a unit, means being provided for adjusting said spindle longitudinally of said barrel while said spindle and said barrel are held against axial rotation.

2. In a tracing stylus mounting, in combination, a tubular longitudinally-feedable slide barrel; a tracing stylus spindle longitudinally arranged within said barrel and carried thereby; means holding said spindle against rotative movements within said barrel; and screw thread connecting means between said non-rotary spindle and said barrel whereby said barrel and spindle are normally locked together for longitudinal feeding movements as a unit, and whereby said spindle can be adjusted longitudinally of said barrel while maintained against rotation with respect to said barrel.

3. In a tracing stylus mounting; in combination, a tubular longitudinally-feedable slide barrel; a tracing stylus spindle arranged therein and carried thereby and held against rotative movements on its longitudinal axis with respect to said barrel; and screw thread connecting means between said spindle and said barrel normally holding the spindle and barrel against relative movements for feeding longitudinally as a unit, including a relatively rotative element for relatively adjusting said spindle longitudinally.

4. A mounting for a tracing stylus, comprising supporting means; a non-rotary stylus-spindle barrel; a non-rotary stylus spindle arranged longitudinally of and carried by said barrel; means holding said spindle and said barrel against axial rotation and an adjusting nut carried by said barrel and relatively rotative with respect to said barrel and said spindle and confined to said barrel against relative longitudinal movement, and having screw threaded connection with said spindle for relative longitudinal adjustment of said spindle while said spindle is held against axial rotation.

5. A mounting for a tracing stylus, comprising a suitable support; a stylus spindle barrel mounted for feeding longitudinally toward and from a pattern; a non-rotary stylus spindle longitudinally mounted in and carried by said barrel; and an adjusting nut rotative with respect to the spindle and the barrel and carried by the barrel against substantial relative longitudinal movements, and having screw threaded connection with said barrel locking the spindle and barrel together for longitudinal feeding movements as a unit, said spindle being adjustable longitudinally of said barrel by rotative movements of said nut and being held in the position to which adjusted by said screw threaded connection.

6. A mounting for a tracing stylus, comprising a support; a tubular barrel longitudinally feedable toward and from a pattern; a non-rotary stylus spindle carried by said barrel; a relatively rotative spindle adjusting nut concentric with said barrel and said spindle; means confining said rotary nut to said barrel against relative longitudinal movements; said spindle provided with a longitudinally screw threaded portion meshing with the screw thread of said nut; a graduated-scale collar rotatively mounted on said nut; and means for releasably securing said collar to rotation with said nut.

7. A mounting for a tracing stylus, comprising, a support; a tracing-stylus-spindle barrel slidably mounted for longitudinally feeding toward and from a pattern and against rotative movements; said barrel provided with a longitudinally projecting tubular head normally rigidly clamped thereto; a tracing stylus spindle mounted in said barrel and head against longitudinal movement and having a longitudinally screw threaded portion; a rotary spindle feed nut concentric with said spindle and meshing with the screw thread thereof; and means rotatively mounting said nut in said head and against substantial movement longitudinally of said barrel and said spindle.

8. A mounting for a tracing stylus, comprising, a suitable support; a longitudinally slidable barrel providing a transverse spring abutment; a tracer stylus arranged longitudinally of and carried by said barrel and providing a transverse spring abutment; a screw threaded connection between said barrel and said spindle and normally locking the same together against relative movements, for feeding longitudinally as a unit, said connection embodying means for relatively adjusting and setting said spindle longitudinally of the barrel; means for feeding said barrel and stylus as a unit longitudinally toward and from a pattern; and an expansion spring arranged longitudinally of said spindle and acting longitudinally on said barrel and spindle in opposite directions through said abutments.

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