Oct. 29, 1957 Q. S. JOHNSON ET AL 2,810,960

PRECISION ENGRAVING INSTRUMENT

Filed July 6, 1956 2 Sheets-Sheet 1

Fig. 1.

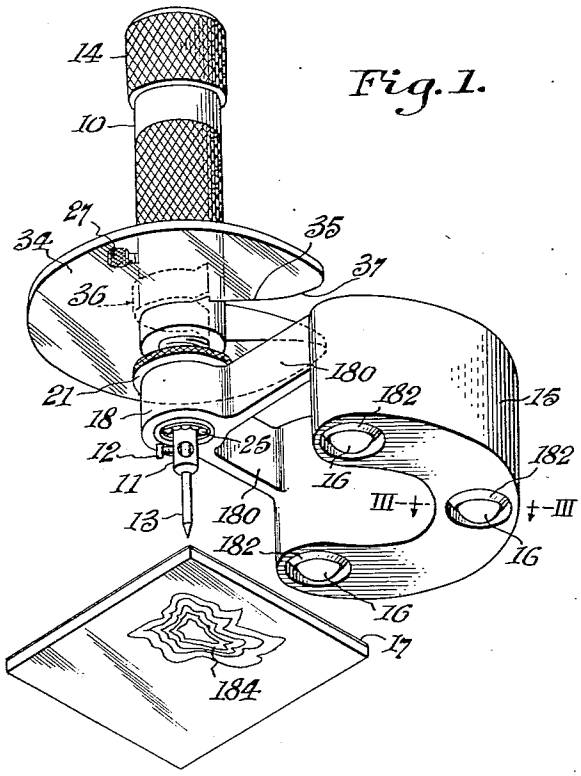


Fig. 2.

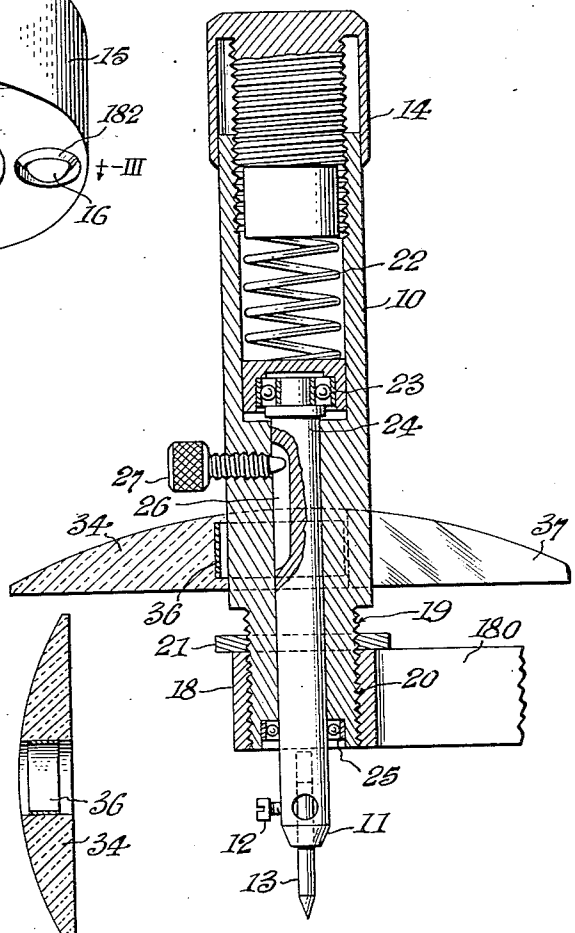


Fig. 8.

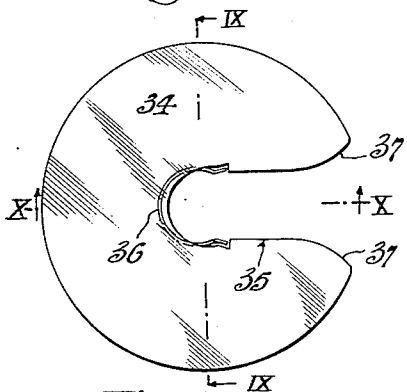
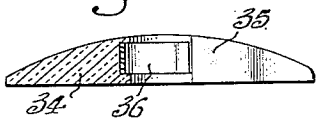


Fig. 9.

Fig. 10.



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Fig. 6.

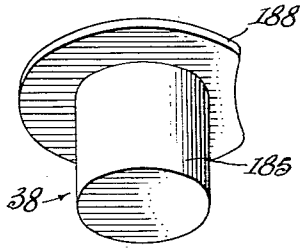


Fig. 7.

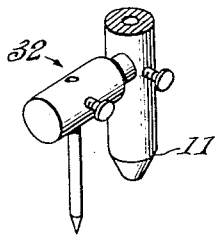


Fig. 4.

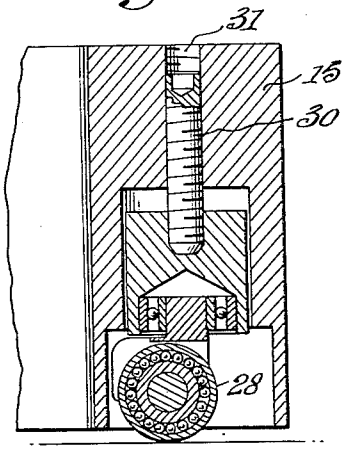
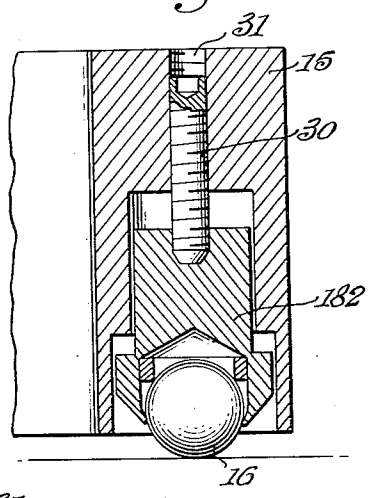


Fig. 3.



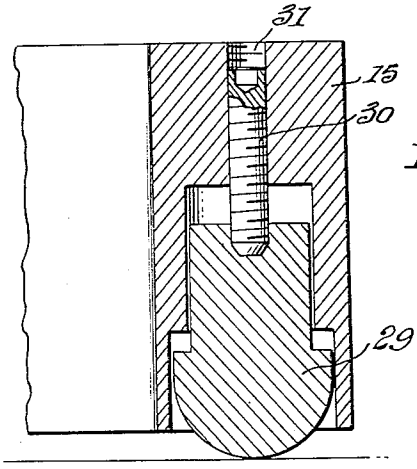


Fig. 5.

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PRECISION ENGRAVING INSTRUMENT

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Application July 6, 1956, Serial No. 596,370

7 Claims. (Cl. 33—18)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

The present invention relates to a device for producing engraved or inscribed linework in or upon various materials for use in the graphic arts. More particularly, the present invention relates to such a device for engraving or inscribing linework in or upon paint, ink, gelatinous emulsion, dyed vehicles, or other materials, applied as a coating upon plastic sheeting, glass sheets, metal sheets or plates, paper, wood, or stone materials.

Existing engraving or inscribing instruments, tools, or other devices are so designed as to be dependent upon the skill of the operator (in the case of existing hand-held devices), or upon costly, heavy, and/or bulky mechanical linkages (in the case of existing mechanical engraving or inscribing devices) for maintenance of optimum pressure at the engraving or inscribing cutting point, in order to produce linework (linewidth) of uniform weight. This invention, which combines in a single hand tool the properties of continuous mechanical control of point pressures (usually associated with large mechanical linkages) and versatility, portability, direct operator control, and relatively low cost typical of the class of hand tools, therefore embodies the major desirable features of an optimum engraving or inscribing instrument.

An object of the invention is to provide a suitable hand-held and hand-operated device for engraving or inscribing operations, having included therein a mechanism for maintaining a constant pressure at the engraving or inscribing cutting point independent of the pressure exerted by the hand of the operator during use, which mechanism includes means for adjusting the cutting point pressure to that required for the material being engraved or inscribed.

Further objects of the invention will become apparent from the drawings and from the following detailed description of the invention, the accompanying drawings being intended to be illustrative of a preferred or typical embodiment of the improvements of the present invention without thereby tending to limit the scope of the invention to less than that of all of those equivalents which will be apparent to those acquainted with the art as defined by the appended claims, it being noted that throughout the drawings like reference numerals refer to like parts.

In the accompanying drawings—

Fig. 1 is a perspective view of the device of the invention;

Fig. 2 is a vertical view, partly in section, of a portion of the device of Fig. 1;

Fig. 3 is a vertical sectional view showing a form of mounting means for the instrument as shown in Fig. 1, the view being taken on line III—III of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3, but showing a modification thereof;

Fig. 5 is a further view similar to Fig. 3, but showing a further modification thereof;

Fig. 6 is a perspective view of a weighting device or attachment for the device or tool of Fig. 1;

Fig. 7 is a perspective view of an off-setting holder for a scribing device, the view being a modification of the holder shown in Fig. 1;

Fig. 8 is a plan view of a magnifying lens usable on the device of Fig. 1;

Fig. 9 is a vertical sectional view through the lens, the view being taken on the line IX—IX of Fig. 8, looking in the direction of the arrows; and

Fig. 10 is a further vertical sectional view through the lens, the view being taken on the line X—X of Fig. 8, looking in the direction of the arrows.

Referring more particularly to the drawings, the illustrated embodiment of the invention includes a shaft or spindle 10 which is mounted on and carried by a base block 15 by a retainer ring 18 formed at the intersection of outwardly extending converging brackets 180 projecting from the ends of base block 15 which is shown as having an approximately horseshoe shape. The shaft 10 carries at its lower extremity an adjustable point-chuck in which may be fixed, by means of a set screw 12, an engraving or inscribing stylus or cutting point 13. The shaft 10 is provided at its upper extremity with an adjusting nut or sleeve 14 by means of which the pressure at the cutting point 13 may be adjusted by a compression spring or other mechanism concealed in Fig. 1 inside the shaft 10. In Fig. 1, the base block 15 is shown mounted on three mounting feet including freely turnable ball elements 16 mounted in retaining holders 182 and providing equally spaced three-point mounting for the base block 15 and the instrument. The freely rotatable ball element 16 permit the device held in an operator's hand to be moved laterally in any direction over a surface 17 into or upon which engraving or inscribing 184 may be accomplished by cutting point point or stylus 13.

Referring now to Fig. 2, there is shown a detailed vertical view, partially sectionalized, of the shaft or spindle 10 and the shaft retainer ring 18 of the base block 15, shown in Fig. 1. The shaft 10 may be positioned substantially vertically in base block 15 by means of external screw threads 19 on shaft 10 which fit into internal threads 20 in shaft retainer ring 18, and may be secured at the desired vertical position in shaft retainer ring 18 by means of a lock nut 21. Cutting point 13 may be positioned in point chuck 11 and fixed in position therein by means of set screw 12. The pressure exerted by cutting point 13 on surface 17 into or upon which engraving or inscribing 184 is to be accomplished, then may be adjusted to that desired by means of an adjusting nut or sleeve 14 acting through a compressing coil spring 22, a thrust bearing 23, and a sliding internal shaft or piston 24 rotatably mounted in shaft 10 by means of bearing 25. Piston 24 may contain a longitudinal groove 26 in which may be positioned a pointed set screw 27 passing through the wall of shaft 10, which set screw 27 may be so positioned as to permit piston 24 to move longitudinally but not rotatably when the set screw 27 projects into the groove 26. The set screw 27 may be so positioned as to permit both rotational or longitudinal movement to piston 24 when its projection into the interior of shaft 10 is insufficient to permit the point of set screw 27 from entering into the groove 26. It is obvious that the set screw 27 may be tightened to engage and lock the piston 24, if desired, against rotational and longitudinal movement although this is not the normal manner in which the set screw 27 is employed.

Figs. 3, 4, and 5 show modifications of the three-point mounting for the base block 15. As pointed out above, such mounting may be ball-bearing feet 16 freely rotatable in retaining holders 182. These ball-bearing feet 16 may be replaced by miniature freely rotatable casters 28, or

by sliding fixed feet **29**. In any of these forms, the feet may be inserted by means of a screw **30** into threaded bores **31** in base block **15**, to provide the desired degree of resistance to lateral motion of the instrument in use on various materials.

Fig. 6 shows a perspective view of a weight **38** so shaped as to fit within the body of the base block **15**, that is, between the bracket arms **180** of Fig. 1, in such a manner as to provide a weight on the device sufficient to compress spring **22** and to maintain all three of the mounting feet of Figs. 3, 4, and 5, such as the ball-bearing rollers **16**, in contact with work surface **17** without exertion of any hand pressure by the operator to maintain such contact. A series of such weights **38** may be provided in various sizes as may be required to accomplish the objective, each of such weights having a cylindrical body portion **185** insertable between bracket arms **180** with top collar or flange **188** resting on top of the bracket arms **180**. Weights, such as **38**, are employed when the pressure required by spring **22** to scribe heavy or multiple lines is greater than the mass of the unweighted instrument and causes the unweighted instrument to become unstable. The set screw **27** is not "locked" or in rigid contact with the piston **24** whether operating with or without weights, such as **38**. The tip of set screw **27** is adjusted to enter the groove **26** in piston **24** only far enough to restrict rotational motion of the piston **24** and the attached scribing point **13** during scribing operations where non-swiveling action is desired, while permitting the piston **24** to move longitudinally. Contact of the tip of set screw **27** occurs only at one side or the other of the groove **26** to limit rotation of the piston **24** to that angle permitted by the clearance between the sides of the groove **26** and the diameter of the pointed tip of set screw **27**.

With reference to Fig. 7, there is shown a perspective view of an attachment **32** for point-chuck **11**, permitting the cutting point **13** to be mounted in the tool of Fig. 1 at a distance off-set from the longitudinal axis of shaft **10**, thus providing for swiveling of cutting stylus **13** or rotation of such stylus about such axis when set screw **27** of Fig. 2 is backed off sufficiently to be disengaged from groove **26** in piston **24** of Fig. 2. Resistance of the surface **17** into or upon which cutting point **13** is engraving or inscribing, in this instance will cause the cutting point **13** to maintain a constant orientation with respect to the line or lines **184** being engraved or inscribed in surface **17**, irrespective of the direction of lateral motion of the device of Fig. 1.

There may be provided a detachable viewing lens **34** which may be attached to or removed from shaft **10**, as shown in Fig. 1, by means of slot **35** having clip spring **36** fixedly mounted therein adjacent to its inner end. The outer end of slot **35** is formed with diverging guide surfaces **37** for guiding the lens onto the shaft **10** and providing unobstructed removal of the lens from the shaft **10**.

It will be understood that the accompanying drawings and the foregoing detailed description thereof are to be regarded as being illustrative only of a preferred embodiment of the improvements presented by the present invention, and that various structural details are subject to differences which will become apparent to one skilled in the art to which the invention relates, without departing from the spirit of the invention, and accordingly, it will be understood that it is intended and desired to embrace within the scope of this invention such modifications and changes as may be necessary to adapt it to varying conditions and uses, as defined by the appended claims.

Having thus described our invention, what we claim as new and wish to secure by Letters Patent is:

1. An engraving tool comprising, in combination, a tubular engraving holder adapted to be moved manually over a work surface to be engraved with line-work, an elongated member carried within said holder for relative movement therewith, an engraving stylus carried by said elongated member adjacent to its lower end and adapted to engage a work surface being engraved, resilient self-embodied compression means mounted within the holder and engaging said elongated member for continuously exerting a constant outward pressure on the stylus for continuously and constantly pressing the stylus into constant engraving pressure against the work surface for imparting linework engraving pressure between the stylus and the work surface, mounting means for adjustably carrying said holder and maintaining the stylus perpendicular to the work surface, a longitudinal recess in said elongated member and means extending through said holder and projecting into said recess sfor limiting the degree of rotation about the longitudinal axis of said elongated member within said holder.

2. An engraving tool comprising, in combination, a tubular engraving holder adapted to be moved manually over a work surface to be engraved with line-work, an elongated member having an upper and a lower end slidably carried within said holder for relative movement therewith, an engraving stylus carried by said elongated member adjacent to its lower end and adapted to engage a work surface being engraved, compressed resilient means housed in the holder and pressing against the upper end of said elongated member for continuously exerting a constant outward pressure on the stylus for continuously and constantly pressing the stylus into constant engraving pressure between the stylus and the work surface, a longitudinal recess in said elongated member and means extending through said holder and projecting horizontally into said recess for limiting the degree of rotation about the longitudinal axis of said elongated member within said holder, a base block for mounting the holder including a plurality of equally spaced sockets formed in the under surface of said block and means slidably received in each of said sockets, adjusting means in said block communicating with each of said sockets for connection to each of said mounting means for varying the distance each of said mounting means projects vertically beyond the under surface of said base block, each of said mounting means including an element having a curved surface contacting the work surface, horizontally disposed bracket arms convergingly extending from the base block and converging into a holder-receiving ring, the said holder engaging the ring adjacent to the lower end of the holder, the said ring and bracket arms mounting the holder in off-set relation with respect to the base block, cooperating threads in the ring and on lower portions of the holder for enabling adjustment of the holder, elongated member and stylus together in a vertical plane with respect to the work surface being engraved, an adjustable closure cap for the upper end of the holder, and mechanism in the holder actuated by adjustment of the closure cap for selectively adjusting the pressure maintained on the stylus by the stylus-pressing means from one constant value to another.

3. The engraving tool construction as claimed in claim 2, wherein the stylus-pressing means include a pressure compressed coil spring in the holder, maintained compressed by the closure cap, said elongated member transmitting pressure of the compressed spring to the stylus, continuously urging the stylus outwardly with respect to the holder under a selected constant force.

4. The engraving tool construction as claimed in claim 3, wherein the compressed spring acting on the stylus is compressed between an upper piston and a lower piston, said lower piston including a recessed portion, free rolling bearing means seated in said recess and supporting the upper end of said elongated member, the upper piston exerting an adjustable constant pressure on the spring in accordance with selected adjustment of the closure cap, the spring transmitting such pressure to the lower piston secured to the upper end of said elongated member, chuck means carried at the lower end of said elongated member holding the stylus in extended position relative to the holder and operated by the lower piston.

5. The engraving tool construction as claimed in claim 4 wherein the elongated member is supported for rotation about the longitudinal axis thereof in free rolling bearing supports and said chuck means located at the lower end of said elongated member includes a stylus-holding arm extending laterally relative to the elongated member for offsetting the stylus relative to the longitudinal axis of the elongated member.

6. The engraving tool construction as claimed in claim 2 further including a weight insertable between the bracket arms intermediate the base block and holder-receiving ring and mountable on the bracket arms for increasing pressure on the stylus by the stylus-pressure means within the tubular holder.

7. The engraving tool construction of claim 6 wherein the weight includes a body portion insertable between the bracket arms and a top flange spanning the bracket arms and engageable therewith for suspending the body portion on the bracket arms.

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