United States Patent

Schmutzler et al.

[15] **3,662,467**

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[54] ENGRAVING APPARATUS

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[52] **U.S. Cl.** ..... **33/25 B**

[51] **Int. Cl.** **B43l 13/10**

[58] **Field of Search** 90/13.1; 33/23, 25

[56] **References Cited**

UNITED STATES PATENTS

3,171,207	3/1965	Wormser	33/23 C
2,565,821	8/1951	Makishima	33/23 R

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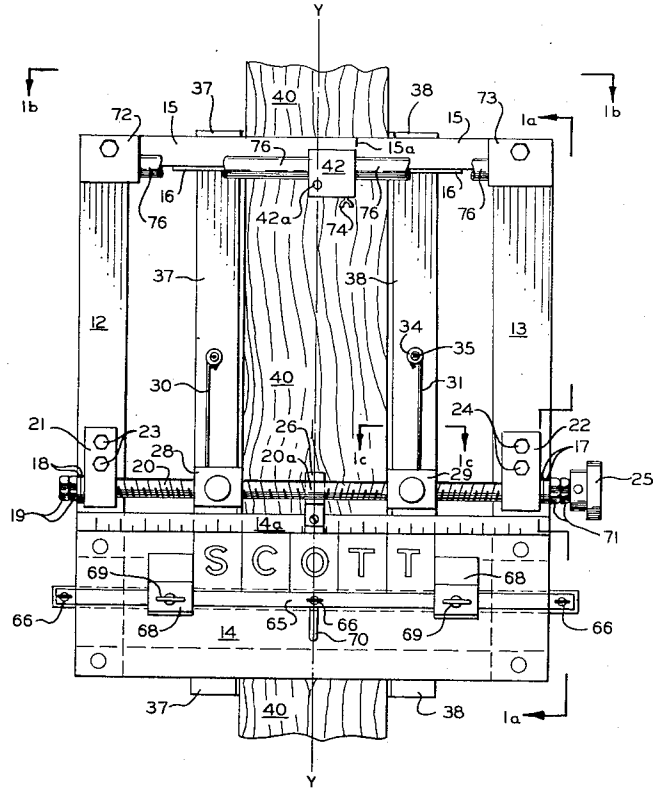
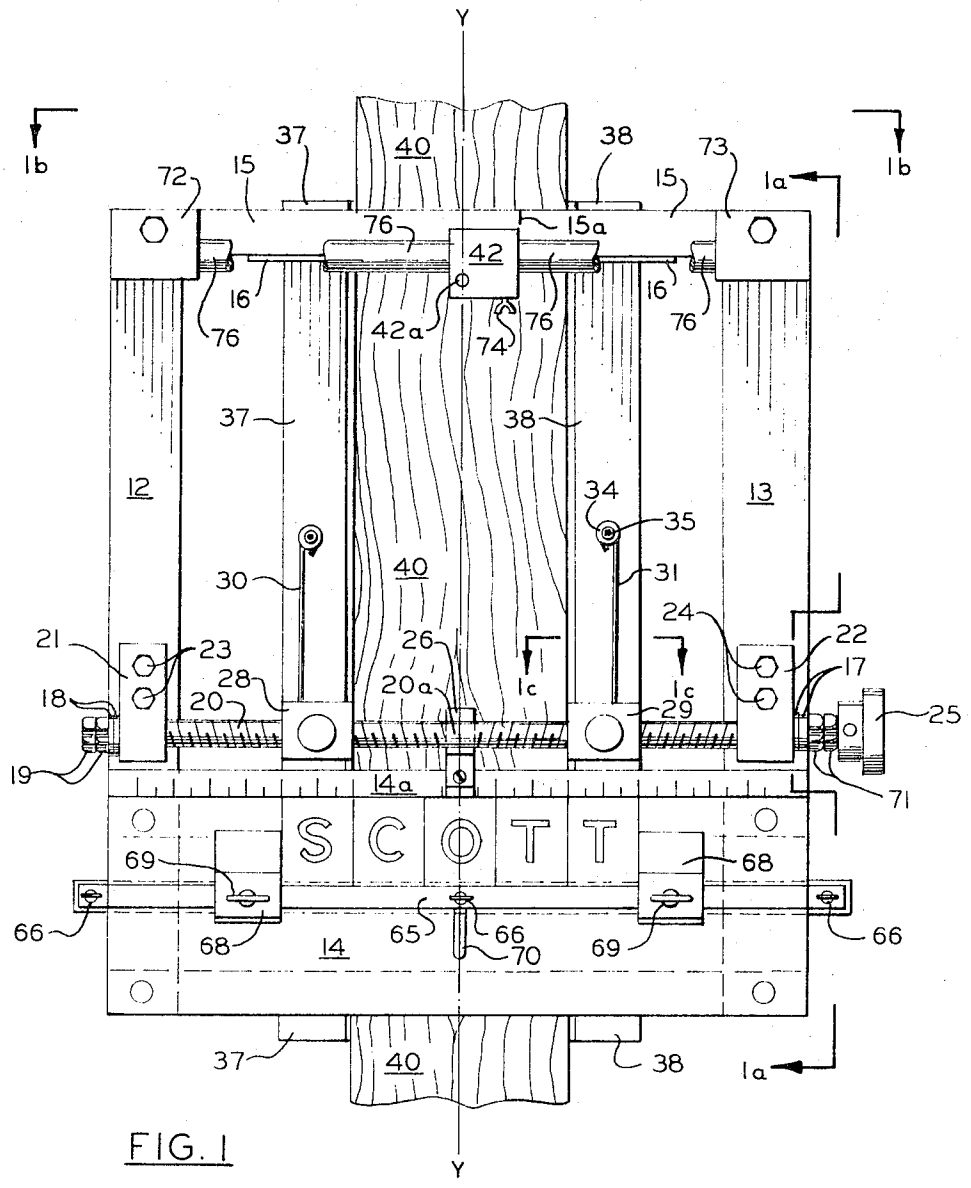
Attorney—Richard G. Stephens

[57] **ABSTRACT**

A pantograph engraver workpiece clamp having a pair of clamping arms each pivotally mounted on respective traveling nuts carried on oppositely threaded portions of a clamping screw, with springs biasing the clamp arms toward a reference direction and the arms extending past scale markings, so that a tapered workpiece may be easily clamped with its centerline aligned relative to an engraving tool reference position and relative to a line of engraving type.

8 Claims, 8 Drawing Figures

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1b
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1a
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31
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21
23
26
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17
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20a
1c
1c
18
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29
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19
14a
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S C O T T
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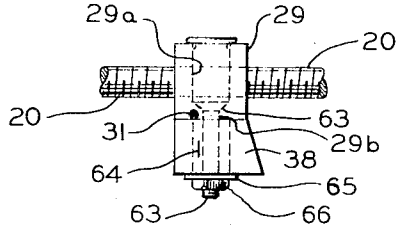
38
Y

FIG. 1


29a
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31
63
29b
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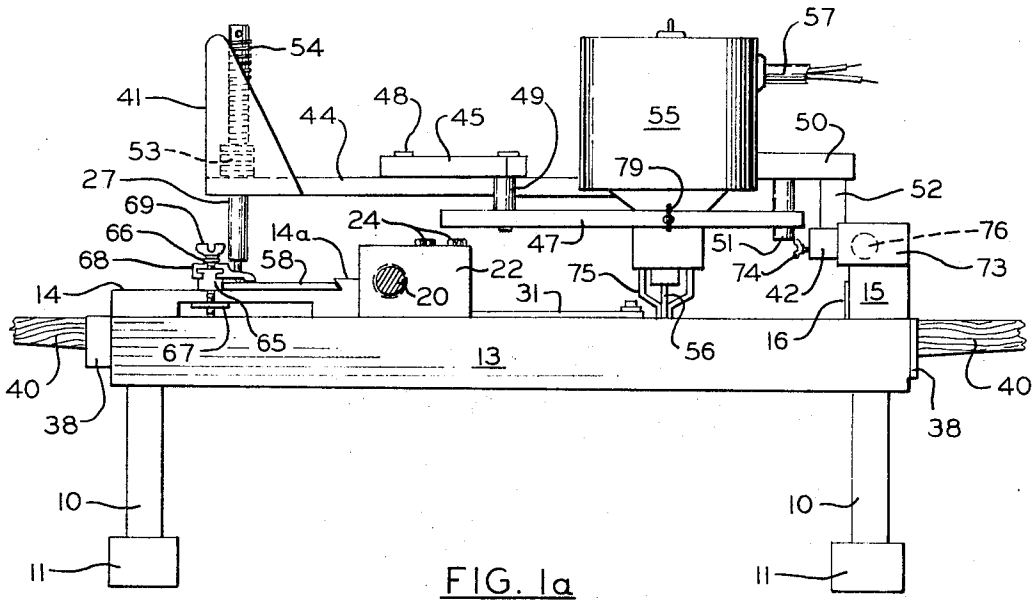
65
63
66

FIG. 1c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74
73
68
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56
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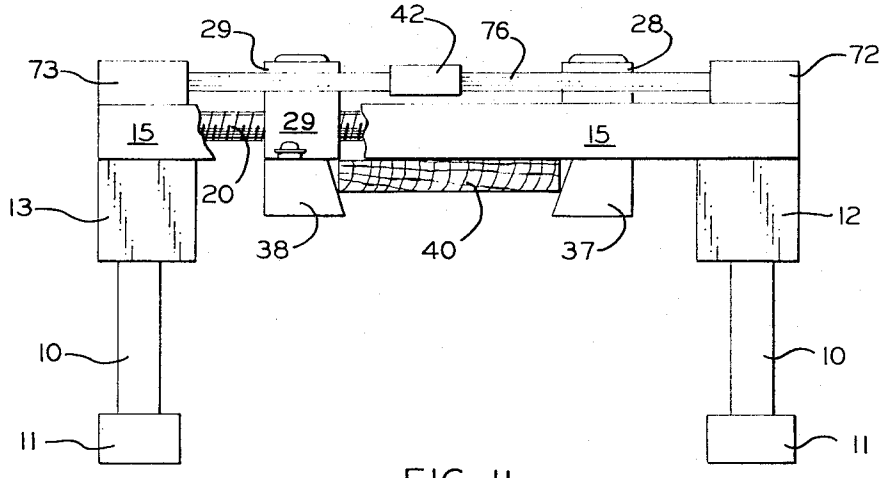
10
11
11

FIG. 1a


42
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76
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10
10
11
11

FIG. 1b

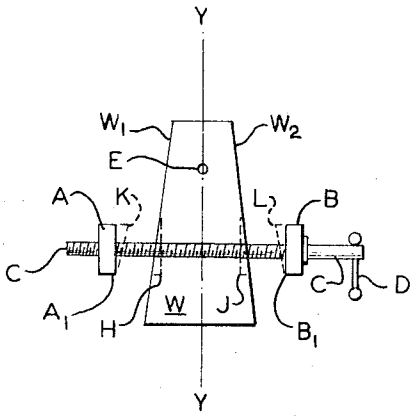

FIG. 2a

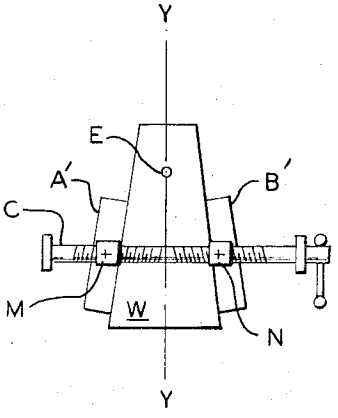

FIG. 2b

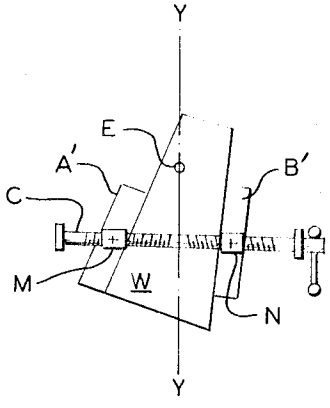

FIG. 2c

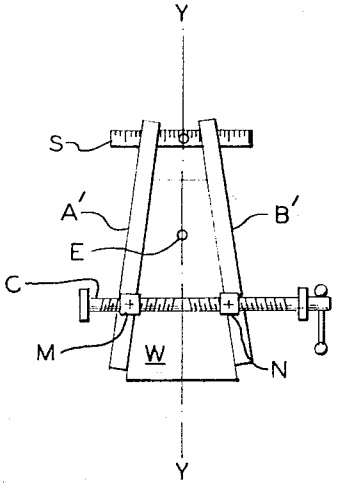

FIG. 2d

ENGRAVING APPARATUS

Our invention relates to pantograph engraver apparatus, and more particularly, to engraving apparatus which may be used by an unskilled operator to engrave letters and symbols and the like very neatly on a variety of elongated articles such as snow skis, water skis, ski poles and golf club handles. The engraving of the owner's name on such articles greatly reduces the probability of theft of such articles and greatly increases the probability of their return when they are lost or misplaced. A variety of pantograph engravers are available for engraving symbols and the like on various forms of jewelry, on flat name tags and signs and the like, and even on bowling balls, but all of those of which we are aware are generally unsatisfactory, for use by a relatively unskilled sporting goods clerk, for example, to engrave names or initials and the like on tapered items such as skis, ski poles and golf clubs.

A pantograph engraver commonly includes a pantograph linkage having a first pivot fixed relative to a machine base, a second pivot carrying a motor-driven drill-like engraving tool, and a third pivot carrying a stylus. Movement of the stylus along grooves in a series of master type pieces moves the engraving tool in a like pattern on a workpiece fixed to the machine base, usually with a decrease in scale. The angle at which a line of engraved symbols will extend along a workpiece depends upon the angle established between the workpiece and the direction at which the master type extends while the engraving is done. Typical pantograph engraving machines used for the engraving of rectangular signs and name plates are provided with workpiece clamps which readily orient the various sides of a rectangular plate workpiece perpendicular to and parallel to the direction at which the master type extends. Most pantograph engravers are quite unsuitable for engraving non-rectangular articles, however, since they will not align such an article to a desired angle. Because skis ordinarily taper in width, from one width near the front end to a different width near the rear end, a simple workpiece vise on an engraving machine will not engage the sides of a ski so as to hold it securely without damaging it, and it will not align the ski with a known and definite relationship to the master type line direction. Because skis are provided in a variety of widths with a variety of tapers, it is not practical to provide spacers or the like to adapt a given ski to an ordinary vise-like workholder. Though the sides of a ski taper slightly toward each other, it is ordinarily desired, for the sake of appearance, that an engraved line of symbols extend across the ski in a direction perpendicular to the centerline of the ski, rather than in a direction perpendicular to either side of the ski. It is also regarded important, for sake of appearance, that the line of symbols be centered. It is absolutely necessary that a ski be held securely without inadvertent or accidental movement while it is engraved, or else the lettering may be ruined, ruining the ski to some extent. One object of the present invention is to provide a pantograph engraving machine which will securely hold tapered workpieces, such as skis, in a desired position relative to the master type line direction, so that a line of engraving may extend perpendicular to a centerline located in between two tapering sides of the workpiece. On very narrow articles, such as the shafts of ski poles or golf clubs, it is frequently necessary that the name, address or other wording desired to be engraved extend in the direction of the centerline of the article, rather than perpendicular to the centerline, and another object of the invention is to provide improved engraving apparatus which will also accomplish that type of engraving.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a plan view of an engraving machine constructed in accordance with the invention with the pantograph portion of the machine omitted in order to afford a better view of the improved workpiece clamping means, which is shown in FIG. 1 clamping a portion of a ski.

FIG. 1*a* is an elevation view taken along lines 1*a*—1*a* in FIG. 1, with the pantograph portion of the machine shown in place.

FIG. 1*b* is an elevation view taken along lines 1*b*—1*b* in FIG. 1.

FIG. 1*c* is a cross-section view taken at lines 1*c*—1*c* in FIG. 1.

FIGS. 2*a*–2*d* are diagrammatic geometrical views useful in understanding limitations of prior art apparatus and the operation and advantages of the present invention.

The nature of the problems involved may be better understood by reference to the diagrammatic views of FIGS. 2*a* and 2*b*. Referring first to FIG. 2*a*, assume that A and B are jaws of a simple vise, with screw C threaded through movable jaw A and passing through unthreaded stationary jaw B, which is longitudinally fixed on shaft C, so that rotation of crank handle D moves jaw A toward or away from stationary jaw B. E represents the reference position of a cutting tool. As crank D is turned to draw jaw A toward jaw B sufficiently to grasp workpiece W between the jaws, it will be apparent that workpiece W will be moved so that the centerline Y—Y of the workpiece will be laterally displaced from the reference position E of the cutting tool, by amounts dependent upon both the average width and the taper of workpiece, i.e. the angle between sides W_1 and W_2 of the workpiece.

Assume now instead that the vise of FIG. 2*a* is a self-centering vise in which screw C does not move endwise, and that the ends of the screw are oppositely threaded, so that rotation of screw C moves jaws A and B in opposite directions. It will be seen that tightening the jaws of such a vise will not move the centerline Y—Y of the workpiece away from the cutting tool reference position E. However, the corners A_1 and B_1 of the jaws will contact the workpiece first, and if the vise is further tightened, on a wooden article such as a ski, for example, the jaws will bite into and deform the workpiece, tending to form notches of the type indicated in dashed lines at H and J in FIG. 2*a*. If all skis had the same taper, one could avoid such damage to skis by providing appropriate shapes for the faces of the jaws, such as those indicated by dashed lines at K and L in FIG. 2*a*, but since the tapers of various skis differ significantly, and because it is usually desirable that an engraver be useful for various articles other than skis, such a technique offers no solution. Also, because a ski is ordinarily a long relatively heavy article, it is necessary that it be held with substantial force while it is engraved. It is necessary that the force be widely distributed in order that the gripping jaws not bite into the sides of the ski. If jaws A and B in FIG. 2*a* are given substantially greater width, so that they extend further along the length of a ski workpiece, it will be seen that they will tend to bite deeper into the sides of the ski.

In order to solve the above problems, the engraving machine of the present invention provides a pair of vise jaws which are each pivotable about a vertical axis. One would ordinarily assume that the use of pivoting jaws would tend to destroy the self-centering action of the centering screw unless the engraving were done in the immediate vicinity of the centering screw, since pivoting jaws allow a workpiece to be clamped in any of a wide variety of angular positions, and it is difficult or impossible to engrave in the vicinity of the centering screw. For example, FIGS. 2*b* and 2*c* each diagrammatically illustrate a workpiece clamping means comprising a screw C threaded in opposite directions on opposite ends, with a pair of traveling nuts M and N threaded on the screw, and with a pair of vise jaws A′ and B′ each pivotally attached to a respective one of the traveling nuts. FIG. 2*b* shows an ideal condition where the workpiece is centered adjacent the cutting tool reference position E when the vise is tightened. However, such an arrangement can clamp the workpiece W just as well in an extreme variety of other angular orientations,

one of which is shown in FIG. 2*c*, where the workpiece centerline will be seen to be substantially displaced from the cutting tool reference position E, and the only portion of the workpiece which is centered on the machine reference axis Y—Y will be seen to be that portion lying under screw C, where it is difficult for a tool to be arranged to engrave, and even if so arranged, the engraving would not necessarily be perpendicular to the workpiece centerline.

However, in accordance with the invention, by the simple expedients of lengthening the pivotal clamping arms **20** that they extend past the cutting tool position, and providing means by which the remote ends of the pivotal arms may be held centered relative to the machine axis while they are tightened, all of the above-mentioned problems are overcome. In FIG. 2*d* pivotal clamping arms A' and B' are shown extended in length past cutting tool reference position E, to where a face of each pivotal arm passes a stationary graduated scale S having graduated scale marks extending in opposite directions on both sides of a zero mark situated on the machine axis. If arms A' and B' are held at equal distances from the zero mark while screw C is rotated to clamp the workpiece, it will be seen that the workpiece will be centered on machine axis Y—Y at its upper end, and because traveling nuts M and N automatically center the workpiece under the screw C, the intermediate portion of the workpiece in the vicinity of cutting tool reference position E will also be accurately centered.

Referring now to FIGS. **1** and **1***a* to **1***d*, the specifically disclosed embodiment of the improved engraver will be seen to include four legs **10,10** having rubber padded feet **11** which support a rigid machine base comprising side bars **12** and **13**, front cross-bar **15**, and a rear platen **14** upon which a line of master type may be fastened. In FIG. **1** the line of type is shown as comprising five pieces of type carrying the letters S, C, O, T and T, in somewhat enlarged form. In FIG. **1***a* the line of master type is shown at **58** clamped against raised edge **14***a* of platen **14**, and edge **14***a* carries scale markings in opposite directions from axis Y—Y to allow a word or name to be easily centered relative to axis Y—Y. An extrusion bar **65** having a cross-section evident from FIG. **1***a* butts against and clamps the pieces of type against edge **14***a*. Thumbscrews **66,66** passing through bar **65** thread into bar **67** which extends across the machine below a portion of platen **14**, as shown in FIG. **1***a*, so that tightening thumbscrews **66** fixedly clamps bars **65** and **67** against the top and a bottom portion of platen **14**. The center one of the three thumbscrews **66** passes through a portion of a slot **70** through platen **14**, slot **70** being approximately centered on axis Y—Y and extending parallel thereto. Clamps **68,68** slidably mounted on bar **65** may be fixed in place by tightening thumbscrews **69,69** to hold the type centered. The line of master type comprises a series of plates having individual letters and/or numerals cut as grooves into the plates. As stylus **27** is moved within the grooves, motor-driven engraving tool **56** follows a similar path on a reduced scale.

A pair of hinge blocks **72** and **73** are mounted atop opposite ends of front cross-bar **15**, and hinge bar **76** extends between block **72** and **73**, being pivotally or rotatably mounted between the blocks. Plate **42** is slidably mounted on hinge bar **76**, and thus adjustable to various lateral positions along bar **76**, and thumbscrew **74** allows plate **42** to be clamped in a desired lateral position on bar **76**. The pantograph linkage, which has a construction well known in the art, includes a pivot post **52** mounted in hole **42***a* (FIG. **1**) of plate **42**. Reference mark **15***a* (FIG. **1**) on bar **15** allows plate **42** to be readily clamped on bar **76** so that hole **42***a* is centered on machine axis Y—Y. If a line of engraving is intended to extend lengthwise along the ski and to be centered on the centerline of the ski, plate **42** is clamped on bar **76** with the edge of plate **42** aligned with reference mark **15***a*, so that the front pivot point **42***a* of the linkage is centered on axis Y—Y. If the line of engraving is intended to extend lengthwise along the ski, but to be offset laterally from the centerline of the ski, plate **42** is clamped on bar **76** either to the left or to the right of the position shown in FIG. **1**.

Pantograph arm **50** mounted atop pivot post **52** is pivotally connected to arm **47** by pivot pin **51**, and pivotally connected to arm **44**, the latter pivotal connection being hidden by motor **55** in FIG. **1***a*. Motor **55**, which ordinarily comprises a universal motor, is bodily carried on arm **47**, and supplied with electrical power via flexible cord **57**, only a portion of which is shown. Arms **44** and **47** are also pivotally connected at opposite ends of bar **45** by pivot pins **48** and **49**. The left end of arm **44** in FIG. **1***a* carries stylus **27**, which is slidably mounted in collar **53** attached to arm **44**, with coil spring **54** interconnecting stylus **27** and collar **53**. As handle **41** on the end of arm **44** (which handle also acts as a guard) is raised or lowered with or against the force of spring **54**, with collar **53** sliding upwardly or downwardly on stylus **27**, the entire pantograph linkage pivots about the axis of hinge bar **76**, raising or lowering motor **55**, so that engraving bit **56** rotated by motor **55** is raised out of engagement with or lowered into engagement with workpiece **40**. A collar **75**, which is shown in cross-section in FIG. **1***a* surrounds a portion of engraving bit **56**, which extends down past the collar for a distance corresponding to the desired depth of cut. Collar **75** presents a widened lower surface which rides against the workpiece when the bit has entered to the selected depth, and hence collar **75** acts as a depth stop. Motor **55** is threaded through link **47** and is clamped with thumbscrew **79**. Depth stop collar **75** is threaded to the portion of motor **55** which extends beyond link **47**. Collar **75** is clamped by tightening against link **47**. The workpiece **40** is clamped so its upper face, which is to be engraved, lies at a vertical level defined by the bottom faces of front cross-bar **15** and platen **14**, which level corresponds to the level of the upper faces of side bars **12** and **13**, and the level of the upper faces of pivot clamping bars **27** and **38**. The inner faces of clamping bars are preferably tapered, as best shown in FIG. **1***b*, so that squeezing the workpiece between the clamping bars also forces the workpiece upwardly against bar **15** and platen **14**. As the stylus is moved forwardly (rightwardly in FIG. **1***a*) or laterally (perpendicularly to the plane of FIG. **1***a*), engraving bit **56** is moved similarly, usually at a reduced scale.

Bearing block **21** affixed to side bar **12** by bolts **23** and bearing block **22** affixed to side bar **13** by bolts **24** rotatably carry opposite ends of shaft **20**. Shaft **20** is retained lengthwise by washers **18** and locknuts **19** on one end, and by washers **17** and locknuts **71** on the other end. Knob **25** is secured to the end of shaft **20**. A U-shaped tab **26** mounted to extend from platen **14** engages an unthreaded center portion **20***a* of shaft **20**, providing further bearing support. The portions of shaft **20** on opposite sides of section **20***a* are oppositely threaded, one portion having a right-hand thread and the other a left-hand thread. Traveling nut or threaded block **28** is carried on one threaded portion of shaft **20**, and traveling nut or threaded block **29** is carried on the oppositely threaded portion of the shaft. As knob **25** is rotated in one direction it will be seen that blocks **28** and **29** will be drawn together, while rotation in the other direction will spread apart the two blocks. The blocks are positioned on shaft **20** during assembly of the machine at equal distances from a center point of shaft **20** at the unthreaded portion **20***a*, and as the blocks are driven together or spread apart by rotation of knob **25** in one direction or the other the two blocks always lie at equal distances in opposite directions from the center point of shaft **20** at **20***a*. The center point of shaft **20** at **20***a* and the center mark of scale **16** (FIG. **1**) define a machine centerline Y—Y. Master-type centering scale **14***a* (FIG. **1**) on platen **14** and reference line **15***a* on bar **15** are so positioned that the cutting tool reference position, which is diagrammatically shown at E in FIGS. **2***a*–**2***d*, falls on the machine centerline Y—Y.

As well as its threaded horizontal bore through which screw **20** passes, block **29** (FIG. **1***c*) includes a two-diameter vertical bore having an upper portion **29***a* and a smaller diameter lower portion **29***b* connected by a countersunk section adapted to receive the head of flat head machine screw **63**,

with the flat head of screw **63** lying below screw **20**. Screw **63** extends downwardly from block **29** through pivot bushing **64**, which extends through a vertical bore through clamping arm **38**, and washer **65** and nut **66** hold bushing **64** tightly against block **29**. Thus it will be seen that pivot arm **38** may pivot about the vertical axis of bore **29***a*. The axis of vertical bore **29***a* intersects the axis of the horizontal threaded bore through block **29**. While pivot bar **38** is thus arranged to pivot in a horizontal plane about the vertical axis of bore **29***a*, it is biased toward a straight-ahead reference position parallel to side bars **12** and **13** by wire spring **31**, one end of which is fixedly fastened to bar **38** by means of washer **34** and screw **35**, and the other end of which extends into a hole in block **29**. Pivot arm **37** is pivotally mounted on threaded block **28** in the same manner in which arm **38** is mounted on block **29**, and arm **37** is similarly biased to a straight-ahead position by spring **30**. In FIG. **1** the workpiece **40** is shown with parallel sides, or no taper, for ease of illustration, although, as stated above, a principal object of the invention is to allow the engraving of workpieces which do not have parallel edges.

Pivot bars **37** and **38** between which the workpiece is grasped, both extend for substantial distances on both sides of their respective pivot axes, as illustrated in FIG. **1**, where the pivot bars are shown extending to slightly beyond front cross-bar **15** and slightly beyond the rear edge of platen **14**, so that the pressure applied to the sides of the ski is widely distributed along a substantial length of the ski, thereby allowing pivot bars **37** and **38** to securely grip the ski without biting into its sides or edges.

Because traveling nut blocks **28** and **29** are centered equal distances from machine centerline Y—Y in FIG. **1***a*, it will be apparent that the portion of ski **40** lying under shaft **20** will be accurately centered on axis Y—Y when knob **25** is tightened to clamp the ski. However, it is possible for the pivot bars to be tightened so that the portion of the ski then lying adjacent the engraving tool does not then lie centered on machine axis Y—Y. In order to accurately center the lettering on the ski, it is necessary that the ski be centered on machine axis Y—Y where the ski lies under the engraving tool. To insure the centering of that portion of the ski, scale **16** is provided on front cross-bar **15**, with a zero center mark of scale **16** situated on axis Y—Y, and with equal graduations extending along the scale on opposite sides of the zero or center mark. If the front end of the ski is held centered so that its edges lie equal distances from the center mark on scale **16** while knob **25** is turned to tighten the pivot bars, the ski then will be locked in position so that it is centered on machine axis Y—Y at two different places along its length, one place being adjacent scale **16** and the other being adjacent shaft **20**. If the ski sides are straight, the centering of the ski at those two places then will also guarantee that the ski is centered in the area of the engraving tool, no matter the width of the ski or how the ski tapers.

While the line of type is shown in FIG. **1** as being aligned parallel to the axis of lead screw **20** and perpendicular to axis Y—Y, it will be apparent at this point that one or more lines of type may be aligned so as to extend parallel to axis Y—Y and perpendicular to lead screw **20**, so that wording may be made to extend along rather than across a ski or similar workpiece, and as mentioned above, varying the position at which plate **42** is clamped on hinge bar **76** allows the lateral position of such vertical lines of working to be adjusted.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not a limiting sense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an engraving machine having a base, a pantograph linkage pivotally attached to said base, an engraving tool and a stylus carried on said pantograph linkage, and means for mounting a pattern on said base for traversal of said pattern by said stylus, the combination of workpiece clamping means comprising a lead screw rotatably mounted on said base, said lead screw having first and second portions threaded in opposite directions, first and second traveling nut means carried on said first and second portions, respectively, of said lead screw, first and second workpiece engaging arms pivotally mounted on said first and second traveling nut means, respectively; and scale means carried on said base for indicating pivotal movement of said workpiece engaging arms from a reference direction.

2. A machine according to claim **1** having spring means for biasing each of said workpiece engaging arms to substantially said reference direction.

3. A machine according to claim **1** in which said lead screw extends in a second direction perpendicular to said reference direction.

4. A machine according to claim **1** in which said scale means extends perpendicularly to said reference direction.

5. A machine according to claim **1** wherein said pattern comprises a plurality of alphanumeric characters aligned relative to each other to extend along a line, and wherein said machine includes means for clamping said pattern to said base to that said line of said characters extends parallel to said lead screw.

6. A machine according to claim **1** wherein said pattern comprises a plurality of alphanumeric characters aligned relative to each other to extend along a line, and wherein said machine includes means for clamping said pattern to said base so that said line of said characters extends perpendicularly to said lead screw.

7. A machine according to claim **1** having means for adjustably shifting the position at which said pantograph linkage is pivotally attached to said base in a direction parallel to the axis of rotation of said lead screw.

8. A machine according to claim **7** having reference mark means on said base for adjusting the position at which said pantograph linkage is pivotally attached to said base to a reference position.

* * * * *