Feb. 10, 1953 E. T. GREEN 2,627,658

ENGRAVING MACHINE

Filed April 3, 1947 3 Sheets-Sheet 1

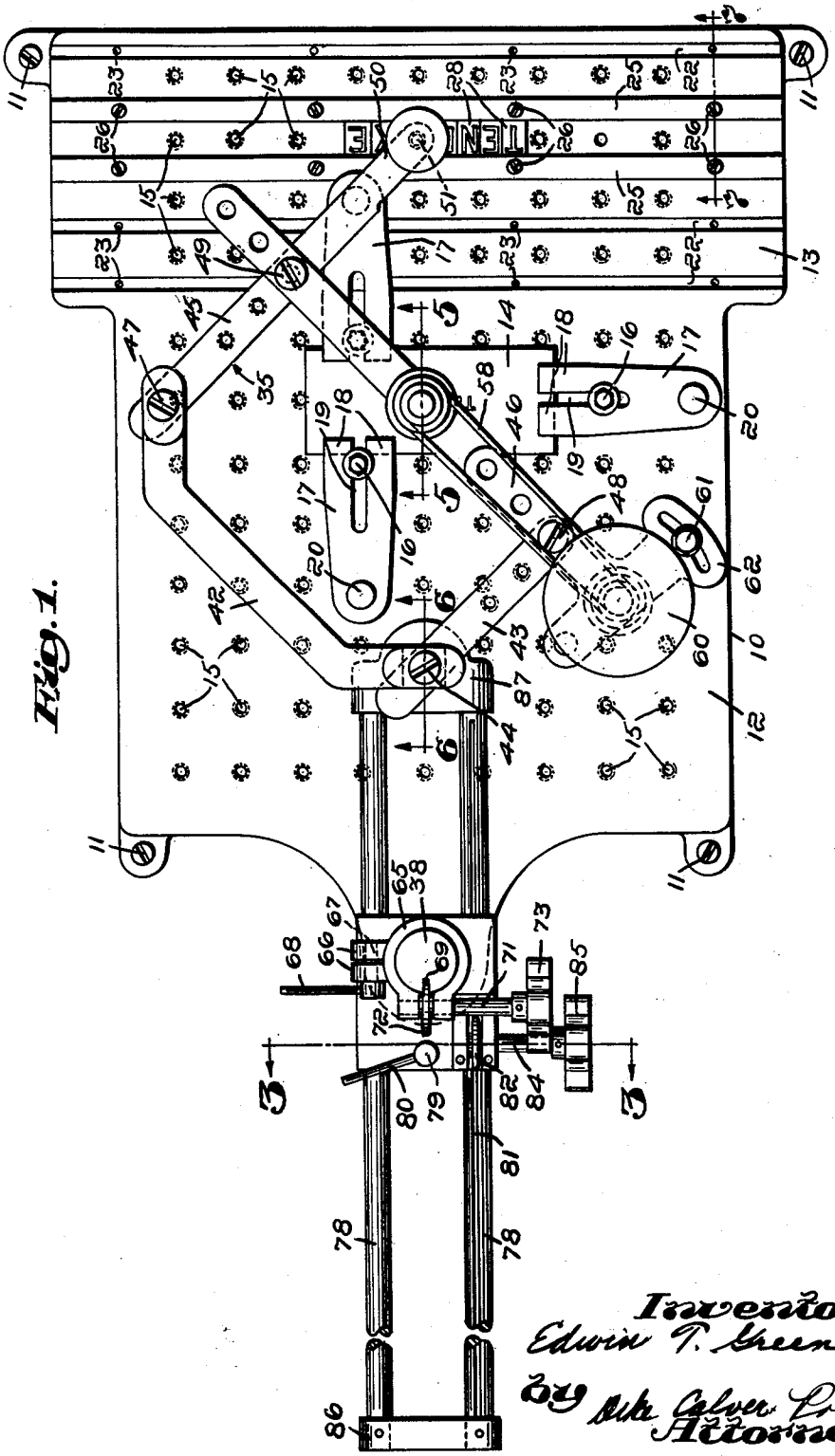


Fig. 1.

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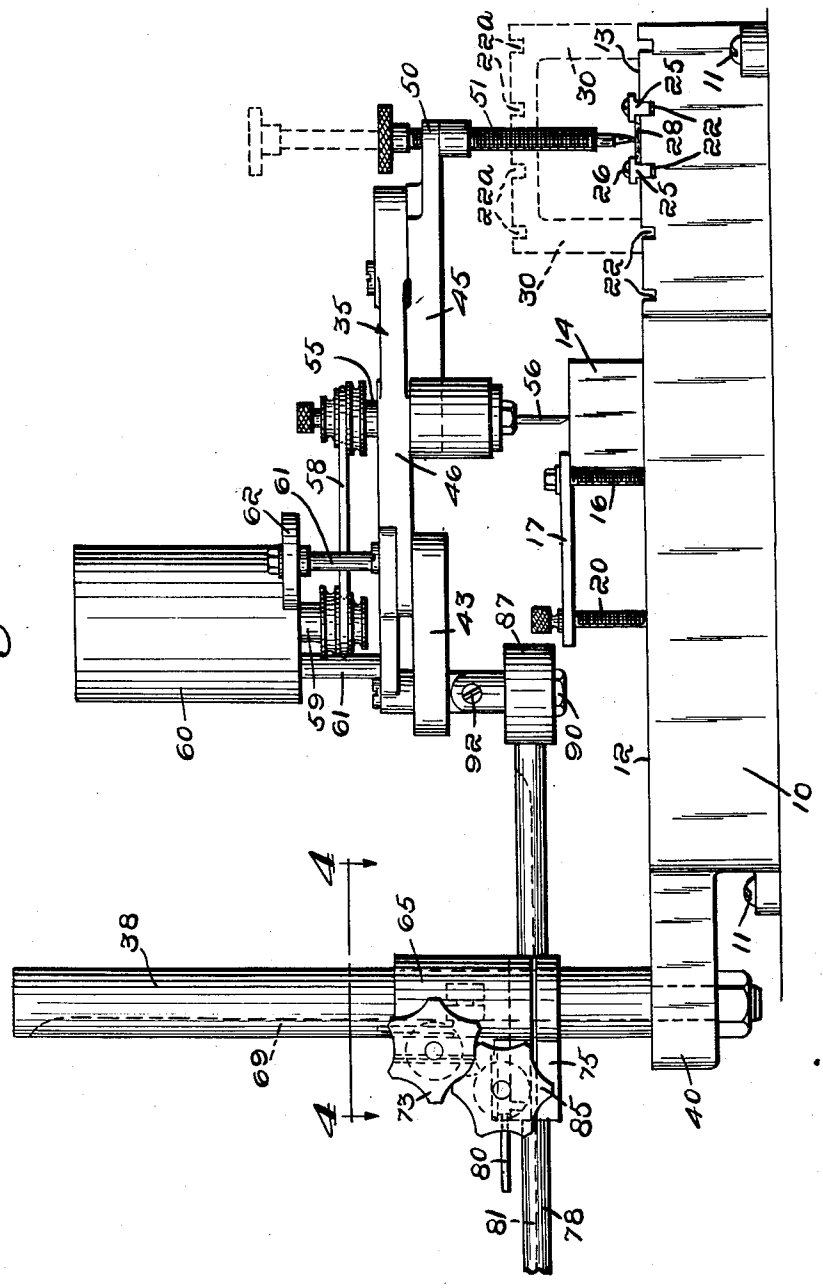


Fig. 2.

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Fig. 3.

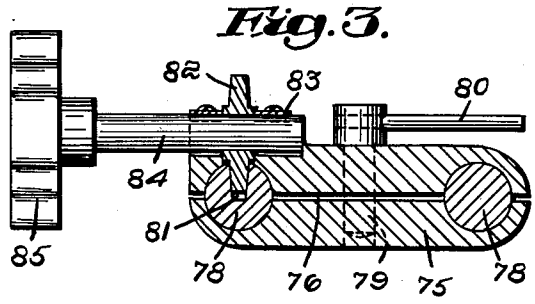


Fig. 4.

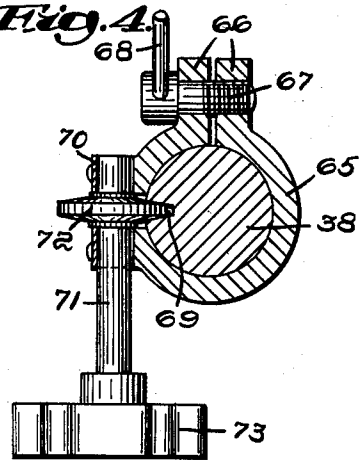


Fig. 5.

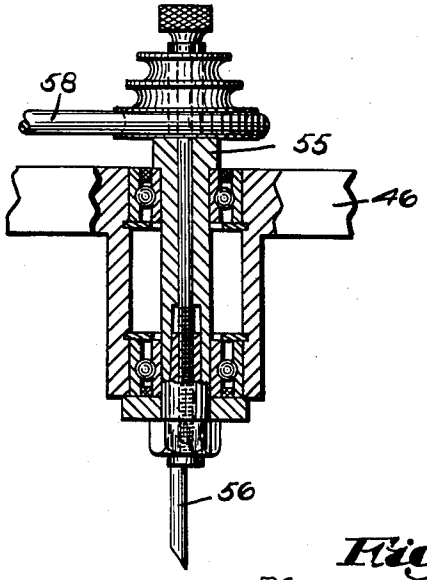


Fig. 6.

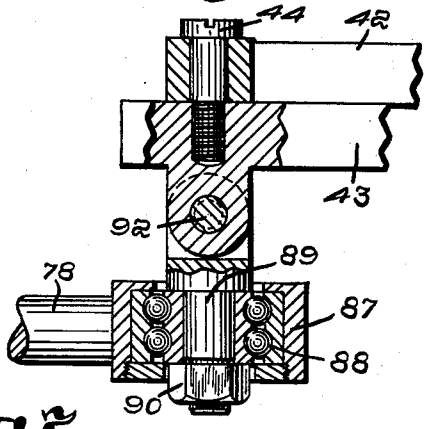
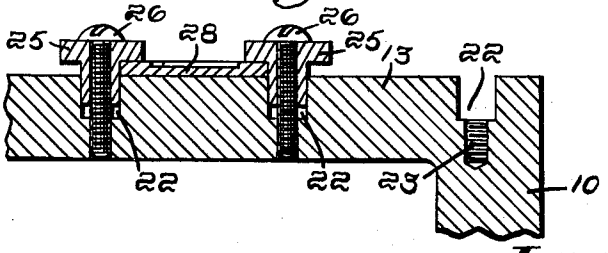


Fig. 7.



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UNITED STATES PATENT OFFICE

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ENGRAVING MACHINE

Edwin T. Green, Cambridge, Mass.

Application April 3, 1947, Serial No. 739,159

5 Claims. (Cl. 33—25)

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This invention relates to engraving machines of the pantograph type, and has for its object to provide an improved machine having new and important features and advantages over existing machines, whereby the machine is enabled to do better work and at lower cost.

In existing engraving machines of this type, so far as I am aware, a separate copy carrier is provided which lies on a different plane from that of the work surface being engraved, and this frequently causes inaccuracies in the engraving, due to lack of parallelism between the copy and the work. In the present machine a single flat bed is provided which carries both the copy and the work on the same plane. The copy rests on the bed of the machine itself, and the copy carrier comprises a series of transverse parallel grooves cut in the bed of the machine, together with a series of detachable clamping strips which fit into the grooves, and are held in place therein by suitable screws. By this means the copy carrier is made adjustable for different sizes of master copy, sizes of type and the like, merely by taking out clamping strips as needed, and without the necessity of separate and additional copy carriers. Also, if the work piece is of such size that it intrudes upon the usual copy carrier space, this work can also be handled, and the copy carrier can be moved forwardly and reduced to one pair of clamping strips, if necessary. Also, all the clamping strips can be removed and the engraving done free-hand, or a master copy or template can be clamped directly to the bed of the machine, without the use of any of the clamping strips, if desired. Furthermore, the changeable type of copy-carrier having fixed copy type can still be used on this machine. Also, an auxiliary and separate copy-carrier of varying heights to accommodate work of varying heights, can also be used on the copy bed, by using the same grooves. In this case the auxiliary copy-carrier may also be provided with transverse grooves therein and strips fitting therein. At the same time the cost of manufacture of the machine is reduced by this method of making the copy carrier because less machinery is required, and more accurate results are obtained.

The pantograph or cutter arm is also made continuously adjustable both horizontally and vertically, by a novel mounting. By the horizontal adjustment the cutter can be shifted to new positions as needed, without shifting either the master copy or the work, and thus avoiding the careful relocating of the work which is now necessary on existing machines. By the vertical adjustment, work pieces of varying height can be readily accommodated without expensive attachments and extension parts and a rough adjustment of the depth of the cut in the work is also permitted.

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Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways.

Other advantages of my machine will appear in the following specification and accompanying drawings, in which:

Fig. 1 is a plan view of my engraving machine;

Fig. 2 is a side elevation thereof;

Fig. 3 is a vertical section on lines 3—3 of Fig. 1;

Fig. 4 is a horizontal section on lines 4—4 of Fig. 2;

Fig. 5 is a vertical section through the cutting tool on lines 5—5 of Fig. 1;

Fig. 6 is a vertical section through the universal joint on lines 6—6 of Fig. 1; and

Fig. 7 is a vertical section of the copy carrier on line 7—7 of Fig. 1.

In the drawings 10 represents the bed of my engraving machine attached to any suitable base as by means of screws 11. As shown in Fig. 2, the base 10 has a flat top surface lying in a single plane for both the work carrying surface 12 and the copy carrying surface 13. Spaced throughout the area of the work carrying surface 12 are a series of threaded holes 15, preferably arranged in transverse and longitudinal rows, which in turn receive screws 16 for clamping down the work on the work bed 12 in varying positions. The work clamp 17 itself (Fig. 1) comprises a flat plate having clamping ends 18 and is slotted as at 19 to receive the shank of the screw 16 whereby the clamp is made adjustable longitudinally and angularly. A stop 20 is provided in the end of the clamp opposite the clamping ends 18 thereof to provide leverage for the clamping ends 18. In Fig. 2 the clamp 17 is shown in side elevation to clamp a high piece of work for engraving thereon. It will be understood, of course, that the length of screws 16 is variable to accommodated varying heights of work.

The copy carrier 13 comprises a slightly elongated portion of the bed 10 in which is cut a series of transversely extending parallel grooves 22 (Figs. 2 and 7). At spaced intervals in said grooves threaded holes 23 are drilled to receive screws 26. Fitting into the grooves 22 are a

series of complementary T-shaped strips 25 constituting held down plates for the copy 28. As will be seen in Fig. 7 the height of clamping strips 25 is adjustable to accommodate varying thicknesses of the copy plate 28. By reason of the fixed parallel grooves 22 in the copy carrier, the copy plate 28 is always definitely positioned in fixed relation with the rest of the machine. This arrangement of fixed grooves in the copy carrier 13 supplies greater flexibility and adjustability of the copy carrier with respect to the work supported on the work surface 12, and with regard to the size of type used in the copy carrier, by the mere omission of strips 25 for instance. Screw holes 15 are also carried onto the bed of the copy carrier as well to permit clamping of the work thereon, if desired. Other advantages of this arrangement have already been pointed out above. Also the same arrangement of grooves 22 permit the use of separate copy carriers 30 of varying heights as shown in dotted lines in Fig. 2, which in turn carry a series of transverse parallel grooves 22*a*, to receive similar strips 25 for holding the copy on such an elevated copy carrier. By this means work of varying heights can be readily accommodated at the desired level.

As shown in Figs. 1 and 2 a pantograph structure 35 is mounted for pivotal movement upon and across said work bed 12 and copy carrier 13 upon a vertical spindle or post 38 pivotally mounted on rearward extension 40 of the base 10. The pantograph arrangement itself is conventional, and as is well known, comprises linkage wherein movement at one point is translated into similar movement in the same plane and direction in varying ratios of distance. The pantograph comprises a pair of arms 42 and 43 pivoted at their adjacent ends on bolt 44 and at their free ends respectively to arms 45 and 46 by means of bolts 47 and 48 respectively. Arms 45 and 46 are in turn joined for pivotal movement by bolt 49, and arm 45 carries on the extended end 50 thereof the stylus 51. The stylus carries on its bottom end a transverse point and is threaded for adjustment vertically. A vertical rotating spindle 55 carries the cutting or engraving tool 56 and is mounted for rotation about its vertical axis in ball bearings in arm 46 (shown in detail in Fig. 5). As the spindle is of conventional type it is not described in detail. The spindle is driven from a belt 58 from the shaft 59 of an electric motor 60 in turn mounted on posts 61 on extension 62 of arm 46. The motor, of course, is connected to a source of electric power by wires (not shown). It will be understood that as the stylus 51 traverses the letters and design cut on the copy plate 28 the cutting tool 56 will be caused to cut similar letters and design upon the work 14.

The pantograph arms are continuously adjustable both horizontally and vertically to engrave work in practically any location on the bed 12 and of any height up to eight inches. For this purpose a novel mounting is provided which includes the vertical spindle 38 which is held rotatably mounted in extension 40 and carries thereon a vertically slidable collar 65 which is split vertically on one side with flange portions 66 which are threaded to receive clamping screw 67, whereby said collar 65 may be clamped tightly in position by means of handle 68 against vertical movement when desired (Fig. 4). To move collar 65 vertically on spindle 38 a vertical groove 69 with tapered sides is cut in spindle 38 and a bushing 70 is provided on collar 65 to receive a rotatable shaft 71 carrying a tapered disk 72 having a taper similar to that of the sides of groove 69, and designed to fit therein in a friction fit. A handle 73 is provided on the end of shaft 71 to rotate disk 72 in groove 69 and thus to move collar 65 vertically upon spindle 38, when clamping screw 67 has been loosened. At its lower end collar 65 carries a slide 75 (Fig. 3) and which is slotted horizontally at the rear of said slide as at 76 and has horizontal sleeves formed at the sides thereof to receive the two parallel shafts or arms 78 upon which the member 75 lies. Again, member 75 may be held firmly upon arms 78 by being clamped tightly thereon by means of clamping screw 79 having handle 80. Again, means for moving the arms 78 horizontally with respect to said slide 75 is provided in a tapered groove 81 provided in one of said arms 78 and in which a tapered disk 82 is arranged to fit in a friction drive. Disk 82 is mounted on slide 75 in a suitable bushing 83 on shaft 84 and is rotated by handle 85. By this means the arms 78 are moved horizontally in and out of slide 75 whereby the pantograph arms may be positioned horizontally along the bed 12 of the machine. The arms 78 are connected at their rear end by cross member 86 and at their front ends by cross member 87, which in turn serves as the base for mounting the pantograph arms 42 and 43 for universal movement. This mounting is shown in more detail in Fig. 6 and comprises a ball bearing mounting 88, a vertical shaft 89 held therein by nut 90, whereby the pantograph arms may be swung horizontally in any direction. A pivot 92 on a horizontal axis is also provided on shaft 89 whereby the pantograph arms may be moved frequently, to lift or lower the cutting tool or stylus. It will thus be seen that the pantograph is adjustable horizontally and vertically to a great range of positions on the engraving bed, to accommodate a great range of sizes, heights and variations of work, and without the addition of separate equipment. The work and the master copy when once positioned on the bed 12 can be left in place and the cutter shifted as desired without moving either the master copy or the work. The number of separate mounting bases usually required for operating on different sized pieces of work are not needed. The machine is simple and rugged but at the same time can perform a much greater range of work.

It will also be seen that my machine is adapted for three-dimensional reproduction, and that depth of cut can be readily controlled from the depth of cut in the master copy, and may be reproduced in the same ratio of depth as the horizontal cut. Reproduction of a medallion, for instance, will thus be a true copy in the engraved work in all dimensions.

It is obvious, of course, that one horizontal arm may be used for horizontal adjustment of the mounting for the pantograph arms and that a groove may be carried in both of said horizontal arms with complementary friction disk for travelling therein for adjusting the horizontal position of the arms in the collar, without departing from the invention herein and reliance is had upon the doctrine of equivalence to cover such obvious expedients.

I claim:

1. In an engraving machine having pantograph arms carrying a copy stylus and cutting tool, a mounting for said pantograph arms including a vertical rotatably movable spindle, a collar ver-

tically movable on said spindle, and carrying horizontal arms slidably movable in said collar, means for adjusting the vertical position of said collar on said spindle, means for adjusting the horizontal position of said arms in said collar, and a cross-member connecting said arms at one end for supporting said pantograph arms.

2. In an engraving machine having pantograph arms carrying a copy stylus and cutting tool, a mounting for said pantograph arms including a vertical rotatably movable spindle, a collar vertically movable on said spindle, and carrying two horizontal arms spanning the spindle and horizontally slidable in said collar, a vertical groove in said spindle and a rotatable disk frictionally fitting said groove for adjusting the vertical position of said collar on said spindle, and a groove in one or more of said horizontal arms and a rotatable disk carried by said collar frictionally fitting said groove for adjusting the horizontal position of said arms in said collar, and a cross-member connecting said arms at one end thereof for supporting said pantograph arms thereon.

3. In an engraving machine having pantograph arms carrying a copy stylus and cutting tool, a mounting for said pantograph arms including a vertical rotatably movable spindle, a collar vertically movable on said spindle, and carrying two horizontal arms slidably movable in said collar, means for adjusting the vertical position of said collar on said spindle, clamping means for holding said collar in its adjusted vertical position and said arms in their adjusted horizontal position, and a cross member connecting said arms at one end for supporting said pantograph arms.

4. In an engraving machine having pantograph arms carrying a copy stylus and cutting tool, a mounting for said pantograph arms including a vertical rotatably movable spindle, a collar vertically movable on said spindle and carrying two horizontal arms spanning said spindle and horizontally slidable in said collar, a vertical groove in said spindle and a rotatable disk frictionally fitting said groove for adjusting the vertical position of said collar on said spindle, and a groove on one of said horizontal arms and a rotatable disk carried by said collar frictionally fitting said groove for adjusting the horizontal position of said arms in said collar, and cross-members connecting said arms at the ends thereof, one of said cross-members supporting said pantograph arms thereon.

5. In an engraving machine having pantograph arms carrying a copy stylus and cutting tool, a mounting for said pantograph arms including a vertical rotatably movable spindle, a collar vertically movable on said spindle and carrying two horizontal arms spanning the spindle and horizontally slidable in said collar, a vertical groove in said spindle and a rotatable disk frictionally fitting said groove for adjusting the vertical position of said collar on said spindle, and a groove on one of said horizontal arms and a rotatable disk carried by said collar frictionally fitting said groove for adjusting the horizontal position of said arms in said collar, cross-members connecting said arms at the ends thereof, and a universal joint on one of said cross-members supporting said pantograph.

EDWIN T. GREEN.

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