

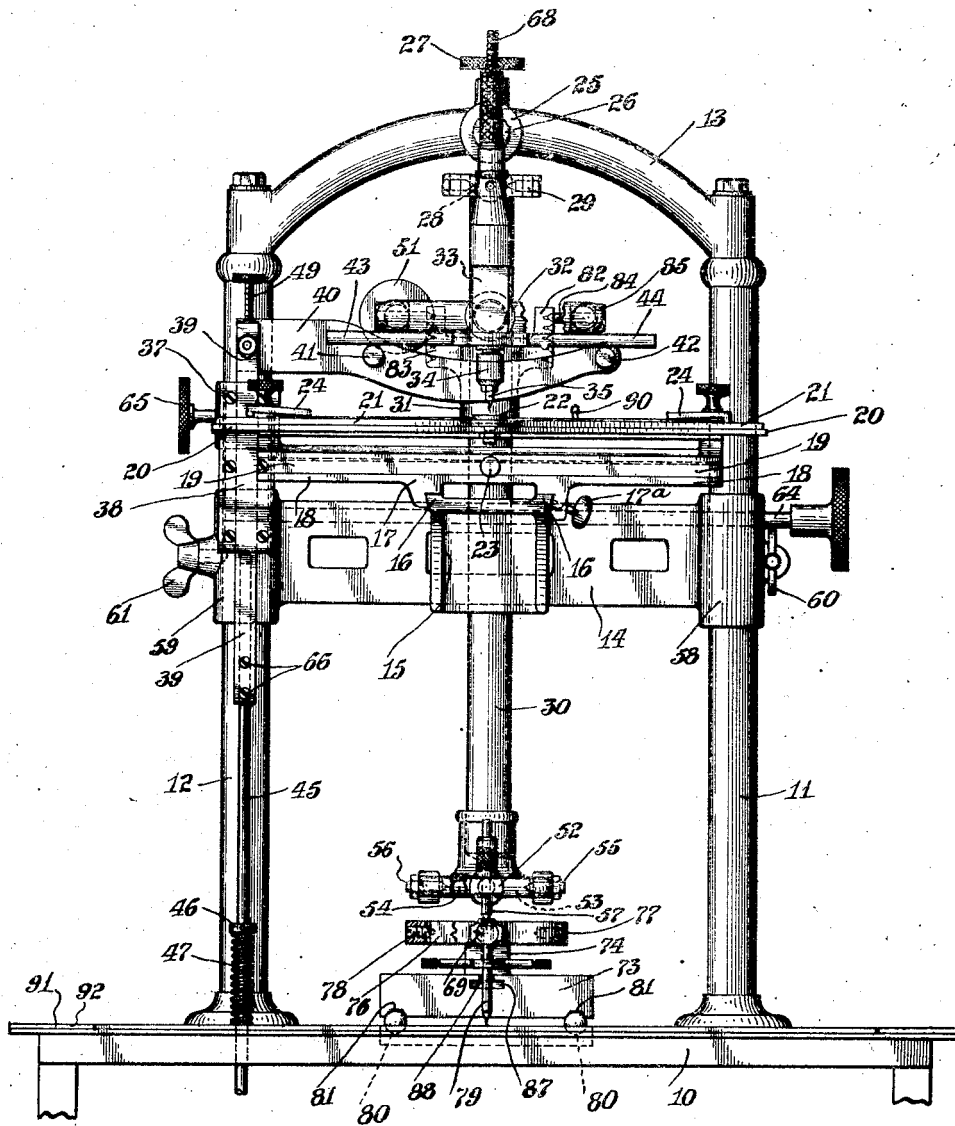
Sept. 1, 1925.

1,551,648

W. S. EATON
ENGRAVING MACHINE
Filed Dec. 4, 1922

4 Sheets-Sheet 1

Fig. 1.



William S. Eaton INVENTOR
BY *Francis J. Neumann*
his ATTORNEY

Sept. 1, 1925.

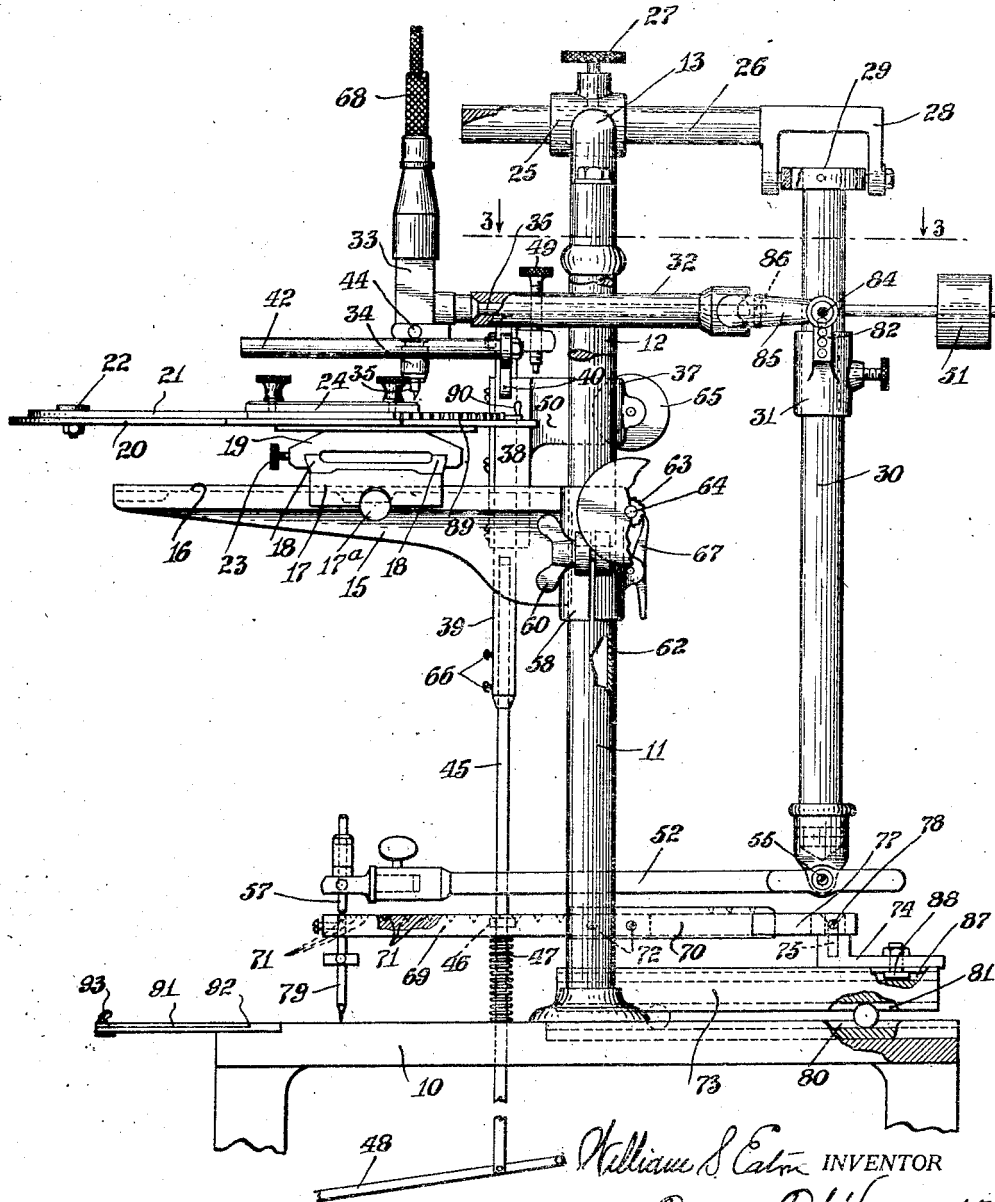
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W. S. EATON
ENGRAVING MACHINE

Filed Dec. 4, 1922

4 Sheets-Sheet 2

Fig. 2.



William S. Eaton INVENTOR

BY *Charles J. Westmatt*

ATTORNEY

Sept. 1, 1925.

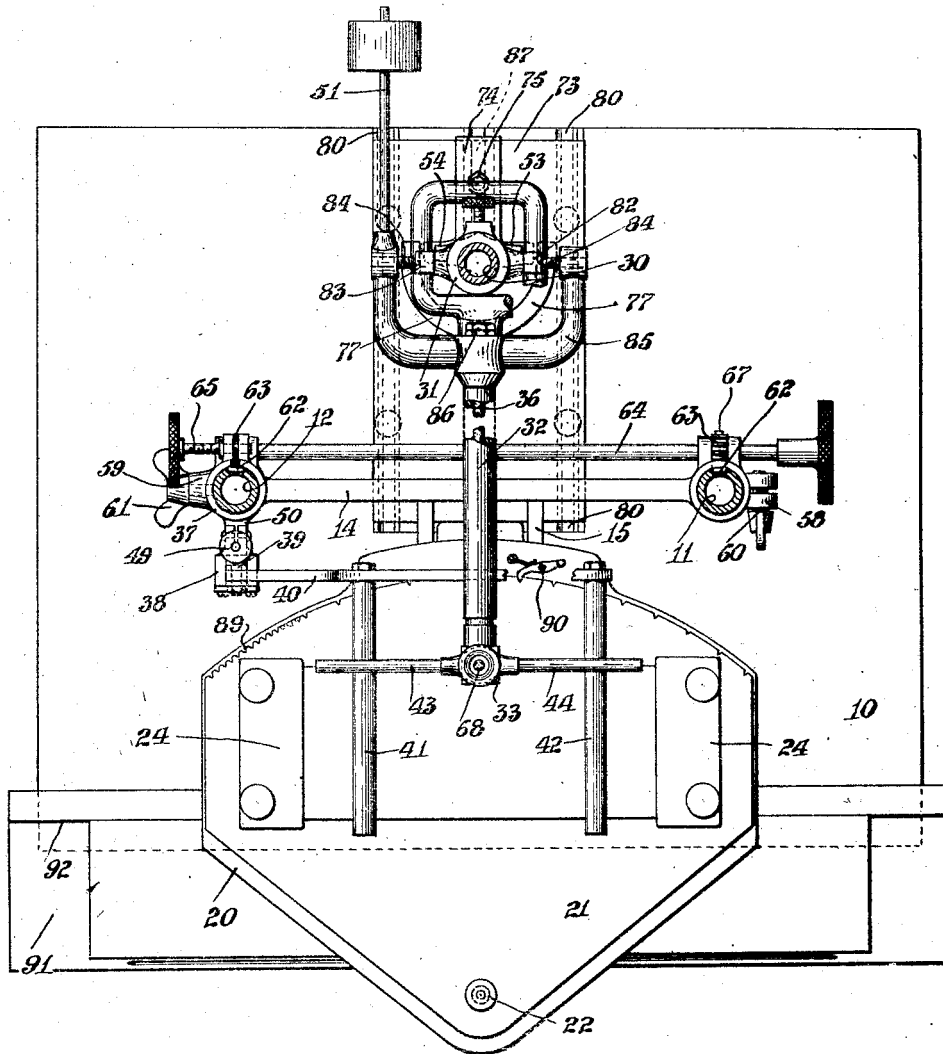
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W. S. EATON
ENGRAVING MACHINE

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4 Sheets-Sheet 3

Fig. 3.



William S. Eaton INVENTOR

BY Frank P. Westworth

his ATTORNEY

Sept. 1, 1925.

1,551,648

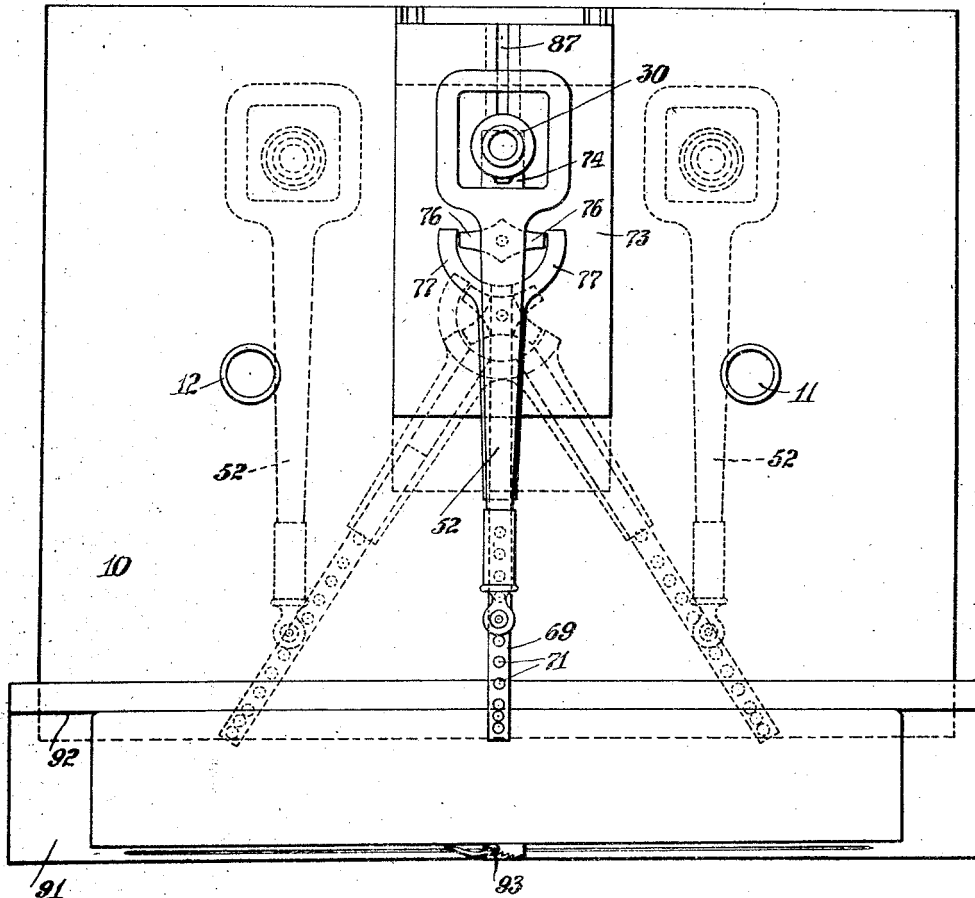
W. S. EATON

ENGRAVING MACHINE

Filed Dec. 4, 1922

4 Sheets-Sheet 4

Fig. 4.



William S. Eaton

INVENTOR

BY *Grant D. Westworth*

his ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM S. EATON, OF SAG HARBOR, NEW YORK.

ENGRAVING MACHINE.

Application filed December 4, 1922. Serial No. 604,650.

To all whom it may concern:

Be it known that I, WILLIAM S. EATON, a citizen of the United States, residing at Sag Harbor, in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Engraving Machines, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to engraving machines, and more particularly to a machine of this type adapted to reproduce letters, numbers of characters upon a work plate in the same position as, but on a scale smaller than, in a pattern or master.

Heretofore engraving machines have been extensively used for various purposes, the character of the work done by means of such machines having ordinarily required great exactitude in the various parts of the machine, to avoid minute error and distortion in the reproduction, and requiring many fine adjustments so as to secure uniformity in the depth of cut in the lines throughout the different portions of the reproduced design.

The machine of my present invention is designed more particularly for use in placing graduation marks, numbers and legends upon panel boards for use upon boxes containing the audions, detectors and the amplifying circuit controls used in and about wireless equipment, or for similar purposes. Upon such panel boards the engraved matter is usually circularly arranged, although some of the legends may be required to be on a straight line.

To facilitate the completion of such boards, it is essential that the machine have a considerable range in the field of operation of the routing attachment, and be capable of quick adjustment so as to permit the economical engraving of such boards as to different, spaced, parts thereof.

With the above conditions in mind, I have produced an engraving machine wherein the routing or engraving tool and the support for the panel-board or like work plate, are capable of such relative movement and adjustment as will permit the production upon different portions of the board, of complete legends or scale markings, while permitting the plate holder in its entirety

to be so moved by other adjustments, as to bring different portions of the board within the normal range of operation of the router.

I also so construct the machine as to permit the adjustment of the portion of the work bed carrying the panel board or other similar work plate, so as to cause, in the reproduction, a circular arrangement of the graduation lines, letters, numerals or characters, although the different lines, letters, numerals or characters of patterns from which such are reproduced, are brought to occupy the same position upon the pattern table, or are arranged in a straight line upon the pattern table.

In a machine embodying my invention, the router is rotated through the medium of a flexible drive shaft, the chuck for the router being supported by a member connected directly with the transmitter arm, the flexibility of the drive shaft for the chuck and the router, permitting that universal movement of the routing tool essential to a reasonably accurate reproduction of different letters, numerals or characters.

The machine is so constructed that the router is normally supported in a plane above the panel board or other work plate by supports in themselves movable toward and from the work table, which supports are so constructed as to permit the necessary free universal movement of the router, upon a single plane, irrespective of the position of the support, while at the same time permitting movement of the router into and out of engagement with the panels board or other work plate.

The pressure for ensuring cutting action by the tool, results from the gravity descent of the tool and its chuck, adjustable means being provided for restricting the downward movement of the supports for the router above referred to, for the purpose of limiting the depth of the cut secured.

I also construct the machine so that the scale of the reproduction, which will always be smaller than the scale of the pattern, may be regulated.

The machine is provided with a mechanism operative upon the main tracing stylus arm by means of which the letters, numerals or characters of the reproduction may be laterally condensed to a variable extent, as

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desired, which attachment will also cause a reproduction wherein such letters, numerals or characters are arranged in an arc or upon a curve, with the centers of these letters, numerals or characters extending parallel with each other, as distinguished from an arrangement by which they all have their centers extending radially of the axis about which they are grouped. The mechanism above referred to is so constructed that the extent of curvature and of condensation may both be varied by a proper setting of the machine, or, if desired, the attachment may be used without modifying the normal operative effects of the machine, a condition which will more fully appear hereinafter.

The machine is also so constructed that, if desired, the letters, numerals or characters of the reproduction may be tilted to the right, or to the left, by a simple adjustment in the machine, and the degree of departure from the vertical resulting in such tilting effect, may be regulated within reasonable bounds.

The invention consists in the novel features of construction and combination of parts hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings—

Fig. 1 is a front view of the upper portion of an engraving machine embodying my invention;

Fig. 2 is a side view thereof;

Fig. 3 is a plan view on the line 3—3 of Fig. 2; and

Fig. 4 is a diagrammatic view illustrating a portion of the mechanism by which the curved, condensed reproduction is secured.

Like numerals refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, 10 indicates a table having mounted thereon parallel vertical columns 11 and 12, connected by a top stay 13 and having adjustably mounted thereon a cross head 14 carrying a work table supporting bracket 15, said cross head 14 and bracket 15 possessing sufficient rigidity to secure the desired firmness of the work table while the machine is in use. The bracket 15 is provided with parallel slideways or tracks 16 upon opposite sides thereof, upon which is slidably mounted, a carriage 17, a set screw 17^a being provided for securing said carriage 17 in any desired position. Said carriage 17 has laterally extending slideways or tracks 18 thereon projecting at right angles to the slideways or tracks 16, upon which is slidably mounted a second carriage 19 supporting a plate 20 adapted to carry the work holder 21 forming therewith a work table, one of the members of which, 20, is capable of longitudinal and lateral ad-

justment, and the other of which, 21, has movement with the plate 20, and in addition to such movement is capable of circular adjustment about a pivot 22 securing it to the plate 20. A set screw 23 is used to secure the carriage 19 in any adjusted position.

The member, or plate, 21 is provided with oppositely disposed work clamps 24 for securing the panel board or other article in fixed position upon the work table.

The plate 21 is provided with one circular edge provided with graduations and corresponding notches as shown more particularly in Fig. 3 of the drawings, by means of which any desired degree of angular adjustment may be imparted to said plate 21 and the clamps 24 carried thereby.

The cross stay 13 has centrally thereof a sleeve 25 in which is adjustably mounted a rod 26 adapted to be set in any adjusted position by means of the set screw 27. Rearwardly of the machine, the rod 26 is provided with a bracket 28 from which is suspended by means of a universal connection or joint 29, a pendulous transmitter arm 30. The joint 29 is of a type generally known as a compass mount, and a detailed description thereof is immaterial, since any desired form of universal joint may be used in lieu of that shown. Furthermore, this type of joint has been extensively used by me in engraving machines, as permitting great nicety in the fitting of the different parts, and the elimination of lost motion due to wear, and resulting in possible loss of precision in reproductions.

Mounted upon the transmitter arm 30 is a sleeve 31 having pivoted thereto by means of horizontally arranged pivots, a work tool actuating arm 32 carrying at the free end thereof a support 33 having a chuck 34 for the engraving tool or router 35. The details of construction of the arm 32 shown in the drawings, are largely matters of mechanical detail, although the pivotal relation between the stem 36 of the support 33 and said arm 32 is to facilitate the adjustment of the work point or router in the event that it is desired to set the machine so as to secure a tilt in the numbers, letters or other characters in the reproduction, as will more fully appear hereinafter. This pivotal relation between the stem 36 and the arm 32 will also compensate for the are described by the transmitter arm 30 about its mount 29 laterally of the machine.

Adjustably mounted upon one of the vertical columns, 12, is a sleeve 37 carrying a slideway 38 upon the side thereof toward the front of the machine, and having mounted therein a vertically movable slide 39 carrying an arm 40 projecting laterally of the machine. Rigidly secured to this arm are

parallel rods 41—42 arranged in the same horizontal plane, which serve as supports for the work tool actuating arm 32, the support 33 for the chuck 34 having laterally extending arms 43 and 44 which engage the rods 41 and 42.

Preferably the rods 41 and 42 and the arms 43 and 44, have rounded contacting surfaces so as to reduce the bearing area to an extent to avoid any such frictional resistance at this point as would materially interfere with the free actuation of the various parts of the machine incidental to the movement of the router 35.

The slide 39 is provided with an adjustable extension 45 having a collar 46 thereon, between which collar and the table 10 of the machine, a spring 47 acts to normally elevate the rods 41 and 42, and therethrough and through the arms 43 and 44, the work tool actuating arm 32 so as to normally disengage the router or other tool from the work plate. The end of the extension 45 is connected with a suitable pedal mechanism 48 so as to permit the operator to move the supporting rods 41—42 downwardly in a convenient manner.

To insure the desired limited extent of movement of the supporting rods 41 and 42 by means independent of the pedal or other mechanism for imparting downward movement thereto, I provide the slide 39 with an adjustable stop screw 49 adapted to engage the extension 50 between the sleeve 37 and the slideway 38, and thus limit the downward movement of the slide 39 and permit the maximum depth of cut of the tool to be reasonably accurately defined, and to be varied to adapt the machine to the reproduction of letters, numerals or other characters of different sizes which require different widths of cut. This variance in the width of cuts is due to the fact that the tool 35 is of gradually increasing dimensions from its point upward, as an ordinary graver, so that the greater the penetration of the tool the greater will be the width of the line being cut. At the same time with a single setting of the stop screw 49 substantial uniformity of depth of the lines in different letters, numerals or characters, is assured. Since precision is not necessary in this character of work, a screw of fairly low pitch may be used, micrometrical adjustment, as in the production of printing plates, metal matrices, and other work of this character, not being required.

Panel boards ordinarily are made of hard vulcanized rubber, bakelite, or other similar material which is sufficiently soft to permit the penetration of the router 35 under fairly light pressure, and as the overbalancing weight of the arm 32 is fairly heavy, in order to secure rigidity, I preferably provide said arm with a counterweighted extension 51 to

avoid excessive penetration of the work plate by the router upon the initial engagement of the router therewith, particularly as too deep a penetration might result in a tendency of the router to chip the material at the edges of the lines being cut, and it is desirable to avoid chipping in the interest of good workmanship.

Mounted upon the lower end of the pendulous transmitter arm 30 is a main stylus arm 52 having formed therein an opening adapted to receive the lower end of said transmitter arm, said arm having oppositely disposed projections 53 and 54 with which pivot screws 55 and 56 carried by said arm 52, engage. This permits movement of the arm 52 with relation to the transmitter arm 30 about a horizontal axis only, for the purpose of facilitating the raising or lowering of said arm 52 to engage the stylus 57 carried thereby with the work, or with a supplemental stylus arm which will be more fully referred to hereinafter, and also to compensate for the arc described by the transmitter arm 30.

It will be readily understood that to secure reasonable accuracy in the reproduction, the transmitter arm 30 must have movement, at the point of connection of the arm 52 therewith, simultaneously with, and similar to that of the stylus 57, the scale of reproduction being determined by the point of connection of the work tool actuating arm 32 with the transmitter arm 30.

The mechanisms heretofore described will permit the reproduction of any desired pattern upon a reduced scale by moving the stylus 57 in accordance with said pattern. To permit substantial variation in the scale of reproduction, the cross head 14 is supported upon the columns 11 and 12 by means of sleeves 58 and 59 which are slidable upon said columns and are adapted to be secured in position by the clamp nuts 60—61 respectively. The back of each of the columns 11—12 is provided with a rack 62 with which pinions 63 carried by the shaft 64 are respectively in mesh, so that the cross head 14 with the parts carried thereby may be moved vertically of the columns 11—12, to accommodate the work table to different adjustments of the arms 32 necessary to secure variation in the scale of reproduction.

The sleeve 37 is also vertically adjustable upon the column 12, this sleeve being split as shown and being provided with a clamp screw 65 for setting it in any adjusted position. This adjustment of the sleeve 37 is for the purpose of maintaining a normal relative position between the supporting rods 41—42 and the work table.

To permit this adjustment of the supporting rods 41—42, the extension 45 is adjustably mounted in the slide 39 so that

by loosening the screws 66, the distance between the slide 39 and the collar 46 may be varied to meet the conditions required by adjustment of the sleeve 37.

Acting upon one of the gears 63 is a locking dog 67 which will supplement the action of the clamp screws 60 and 61 in preventing a loss of adjustment after the machine has once been set for a reproduction upon any desired scale.

Connected with the chuck 34 is a flexible drive shaft 68 which may be connected with an electric motor or any other desired source of power, the support 33 while itself non-rotary, forming a bearing for the end of this shaft adjacent said chuck.

With some work, it is desirable to laterally condense letters, numerals, or characters, as well as to arrange them with their vertical centers parallel with each other although arranged in an arc. To meet this condition, I provide the machine with a supplemental tracing stylus arm with which the stylus 57 of the main stylus arm 52 may be engaged so that movement of the supplemental stylus arm laterally of the machine will impart a lesser quantity of lateral movement to the stylus arm 52, the relative position of these two arms being capable of such adjustment as will permit the control of the extent of this difference in lateral movement. At the same time, the operative effect of this supplemental stylus arm will be to position the different letters, numerals or characters in an arc, the relative adjustment of the two stylus arms above referred to having the effect of varying the radius of this arc.

The above condition results from the fact that when the supplemental stylus arm is used, the pivotal movement of this arm results in a slight arcuate movement of the main transmitter arm 52 because of the variance in the axis of the pivot 75 with relation to the axis of the transmitter arm 30, because of the combined sliding movement of the carriage 73 and the pivotal movement of the supplemental stylus arm. By reference to Fig. 4, it will be observed that the two dotted indications of the main stylus arm upon opposite sides of this figure as to the point of connection between same and the supplemental stylus arm 69, shows that the stylus arms 52 have been advanced slightly with relation to the straight line indicating the path of movement of the stylus 79. Since this change of position will be gradual, it is apparent that there will be a gradual change in the position of the work tool between the central position shown in full lines, and each side position. It is also apparent that this forward position is relatively greater than it would be if the stylus 57 were engaged nearer the end-most recess or depression 71. If it be as-

sumed, with reference to Fig. 4, that the stylus 57 is positioned in the depression 71 closest to the carriage 73 in the central position, and then assume that the dotted position on either side corresponds, it will be noticed that the forward component of movement relative to the lateral movement of the supplemental stylus 79, will cause a materially increased forward movement of the main stylus arm 52 and its stylus.

The supplemental stylus arm referred to is composed of two telescoping sections 69—70, the upper face of the section 69 being provided with a sequence of depressions 71 to receive the point of the stylus 57. Set screws 72 are provided to secure the two sections 69 and 70 of said supplemental stylus arm in any adjusted position.

Mounted upon the table 10 is a carriage 73 carrying thereon a block 74 having mounted therein a pivot 75, the axis of which extends vertically, said pivot having laterally and horizontally extended arms 76 to which the forked end 77 of the section 70 of the supplemental tracing stylus arm is pivotally mounted by means of the pivot screws 78. By this manner of mounting the arm 69—70, said arm is permitted to have universal movement, the slidability of the carriage 73 longitudinally of the machine compensating for the arc described by the stylus 79 carried by the section 69 so as to permit said stylus to follow a straight line upon the pattern. The carriage 73 is mounted upon the table 10 by means of raceways 80 and 81 upon said table and upon said carriage respectively, and bearing balls having movement in said raceways.

It is sometimes desired to vary the reproduction by tilting the letters, which is secured by means of vertical extensions 82 and 83 upon diametrically opposite sides of the sleeve 31, each of which extensions has a sequence of vertical depressions therein adapted to receive pivot screws 84 carried by the yoke 85 of the work point supporting arm 32. The arm 32, as heretofore stated, is connected with the support 33 by means of a rod 36 pivotally mounted in said arm 32, the inner end of which is screw-threaded and carries a lock nut 86 so as to permit angular adjustment of the arm 32 about the axis of said rod 36 carrying the support 33. If it be desired to tilt a reproduced letter, numeral or character in one direction or the other, the pivot screw 84 upon one side of said yoke 85 is engaged with one of the recesses upon the extension 82 while the pivot screw 84 upon the other arm of said yoke is connected with a recess upon the other extension 83, located upon a different horizontal plane from the recess in the arm 82 engaged by the pivot screw, as above referred to.

The carriage 73 is provided with an

undercut groove 87 by means of which the block 74 is adjustably mounted upon said carriage by means of a T-bolt 88.

The circularly adjustable work plate 21 is provided on the rear edge thereof with a segmental notched edge 89 with which a locking member 90 carried by the plate 20 is adapted to co-operate so as to normally prevent relative movement of said plates while permitting a sequence of definite angular movements of the plate 21 upon the plate 20 and about the pivot 22.

The table 10 is provided with a suitable holder 91 for facilitating the mounting of a pattern thereon, this holder including parallel guides 92—93, one of which is movable toward and from the other for permitting the ready shifting of the pattern to bring different letters, numerals or characters in the desired position.

The operation of the herein described machine is substantially as follows.

When it is desired to engrave matter upon a panel board, or similar flat surface, the clamps 24 are used to secure this board in position upon the plate 21, and a pattern is secured in the holder 91. The subsequent procedure will vary according to whether it is desired to arrange the reproduction of the graduation lines, letters, numerals or characters upon the pattern in a straight line or in an arc, or to condense the different letters, numerals or characters, or have their vertical centers parallel with each other or disposed radially of the center of the arc upon which they are positioned.

If it be desired to have the different parts of the reproduction appear in a straight line, the supplemental stylus arm 69—70 need not be used at all, or the stylus 57 carried by the arm 52 may be inserted in the depression 71 of the supplemental stylus arm in axial alinement with the stylus 79. In either case the movement of the transmitter arm 30 resulting from the movement of the stylus 57 or 79 over the lines of the pattern will be the same, the result being a movement of the support 33, chuck 34 and router or work tool 35 in a path exactly coinciding with the movements of the tracing stylus 57 or 79, the quantity of this movement, however, being reduced by reason of the connection of the work arm 32 with said transmitter arm 30 intermediate the point of pivotal support of said pendulous arm 30 and the connection between the end of this arm and the stylus arm 52.

The scale of the reproduction may be varied by adjusting the sleeve 31 longitudinally of the transmitter arm, the nearer this sleeve approaches the universal connection or joint 29, the smaller being the scale of reproduction. It is apparent that any material movement of the sleeve 31 will neces-

sitate a corresponding movement of the cross head 14 and the work table supported thereby, which adjustment is made by means of the shaft 64, pinions 63 and racks 62, the clamps 60 and 61 being used to secure said cross head in relation to the vertical columns 11 and 12 after such adjustment, the dog 64 engaging one of said pinions, as 63, being used solely for the purpose of supplementing the locking action of said clamps in preventing movement of said cross head by preventing rotation of said shaft 64, which is essential to permit movement of the cross head.

It is apparent that adjustment of the stop screw 49 will permit minor adjustments of the sleeve 31 without necessitating corresponding adjustment of the cross head 14.

When the parts have been so adjusted as to secure the desired scale of reproduction, the stop screw 49 may be adjusted to limit the downward movement of the slide 39 to an extent to secure the desired penetration of the router or other tool 35 into the work plate.

The spring 47 will normally hold said slide, the arm 40 mounted thereon, and the supporting rods 41—42, at their uppermost limit, it being necessary to draw the slide downwardly by means of the rod 45 and the pedal 48 to engage said router or other tool with the work, the stop 49 limiting this downward movement and permitting variation in the depth of cut by a mere adjustment of said stop screw with relation to the extension 50 of the sleeve 37.

It is to be noted that in the event of adjustment of the cross head 14, the sleeve 37 may also be adjusted vertically, the rod 45 having telescoping movement within the slide 39.

As the rods 41 and 42 are drawn downwardly, the holder 33, the lateral extensions 43 and 44 of which engage said rods 41 and 42, will descend by gravity, the arm 32 pivoting upon the horizontal pivot screws 84 and at the same time prevent any lateral rotative movement of said holder.

The flexible shaft 68 will not only permit the necessary universal movement of the chuck 34 upon a single plane, but will permit any adjustment of the supporting rods 41 and 42 in changing the scale of reproduction.

Since the location of the support 33 between the supporting rods 41 and 42 will limit the range of movement of the router 35, I provide the superimposed carriages 17 and 19 movable upon slideways which extend at right angles to each other so that the work table in its entirety may be adjusted to bring different portions of the work within the operative range of the router.

If it be desired, however, to arrange the

different elements of the reproduction in an arc, the machine must be adjusted differently from that above described, the adjustment varying according to the character of the reproduction desired. Assuming that it is desired to produce ordinary scale markings with appropriate indicia, all arranged in an arc and the different scale markings accurately positioned with relation to each other, this result is secured by imparting a step by step pivotal movement to the plate 21 about the pivot 22 and successively reproducing a single scale marking upon the pattern sheet, the spacing of succeeding reproductions being determined by the pivotal movement of said plate 21, the notched edge 89 and the co-operating locking member 90 permitting accurate step by step movement of the plate 21. It will be noted that the closer the portion of the plate being worked upon is to the pivot 22 the closer will be the graduation marks with relation to each other, but that the same accuracy will be present so that by adjusting the carriage 17 along the guideways or tracks 16 therefor upon the bracket 15, the spacing between the graduations may be varied.

If it be desired to produce an outline for the graduations, this may be done by holding the stylus 57 or 79 stationary, bringing the slide 39 downwardly so as to engage the router with the work and imparting continuous rotary movement to the plate 21.

It will be noted that in the above operations, the movement of the tracing stylus will be within very small compass, since the shifting of the router 35 is not required, except to reproduce the character, the spacing being secured by the movement of the plate 21. Hence, if it be desired to place numerals or letters in relation to said gauge markings, it will be necessary to bring the pattern of each of such into the same position upon the pattern holder, or within the range of movement of the stylus, without any lateral shifting of the latter.

If it be desired to reproduce graduations, or other matter arranged in an arc upon different portions of a plate being worked upon, the carriages 17 and 19 are adjusted upon their respective slideways so as to position the plate with relation to the router 35 instead of the usual practice of moving the router into position with regard to different portions of the plate.

When characters are to be associated with different graduation markings, and it is desired to have the centers of these characters arranged parallel one with the other, the carriages 17 and 19 may be moved to bring those portions of the plate where the characters are to be positioned, within the range of the router, the plate 21 not being pivotally moved during the reproduction of such characters. If, however, it is desired

to have the centers of these characters extend radially of the axis of the graduations arranged in arc, the carriage 17 only will be moved, to secure the desired vertical spacing, and thereafter the plate 21 will be pivotally moved after the reproduction of each of such characters.

Instead of moving the carriage 17 to bring different portions of the plate within working range of the router 35, the rod 26 may be adjusted in the sleeve 25 with the same effect.

In the use of the machine in the manner above described, the stylus 57 will be engaged with the depression directly above the stylus 79.

It is sometimes desirable, however, to condense the insignia used with a scale, or to even arrange numerals and letters or legends without regard to any definite scale, but in an arc under which conditions I do not impart pivotal movement to the plate 21, but merely utilize the supplemental arm 69--70 in a manner to simultaneously condense letters to the desired extent and at the same time cause them, in the reproduction, to be arranged in an arc, although in the pattern itself, these letters or numerals are arranged upon a straight line. When this attachment is used no shifting of the characters of the pattern is required, and the pattern in its entirety may be laid out upon the table 10 and the accurate positioning or placing of the different letters, numerals or characters is secured by the lateral shifting of the tracing stylus with a resultant lateral movement of the transmitter arm 30 and the router 35.

The condensing action above referred to results from the fact that when the stylus 57 is shifted into different depressions 71, the movement of the stylus 79 as defined by the pattern will have the effect of causing similar vertical and lateral movements of the stylus 57, the lateral movement being less than that of the stylus 79 as determined by the difference in the distance in the movement of the stylus 79, and the point of the arm 52 carrying same with which the stylus 57 is engaged. This condition introduces a vertical component of movement to the stylus 57 which, as a result of the sliding movement of the carriage 73, is relatively less, with a lateral movement of the arm 52, than with a movement thereof parallel with the raceways 80 and 81. This reduced lateral movement being simultaneous with the longitudinal movement, or movement parallel with said raceways, introduces a curve in the reproduction, or a stepping of the different characters along a line oblique to the horizontal.

The closer the stylus 57 is to the vertical pivot 78, the greater the longitudinal movement of said carriage 73 with relation to

the lateral movement of the stylus 57, will be, thus causing a greater angle of obliquity in the reproduction, or a shorter radius of the arc in which its characters are arranged, with an increased lateral condensation of the letters, numerals or characters.

Since the movements of the router 35 are similar to those of the tracing stylus 57, the curvature of the reproduction will always be with the top thereof toward the back of the machine so long as the stylus 57 is positioned between the stylus 79 and the carriage 73.

If desired, the section 69 may be extended with relation to the section 70 so as to bring some of the recesses 71 forwardly of the stylus 79, in which case a reverse curvature or obliquity will result in the reproduction. By shifting the block 74 upon the carriage 73 by means of the undercut groove 87 therein and the T-bolt 88, the length of the arms 69 and 70 may be shortened or lengthened according to the direction of adjustment of said block, thus causing a relatively greater movement of the block with the same lateral movement of the stylus 79 over the pattern, which will reduce the radius of the arc of the reproduction with a shortening of said arm, or increase this radius, with a lengthening of the arm, with a corresponding decrease in the length of the lateral lines of the reproduction, or an increase in said lines respectively, it being understood that the length of the vertical lines of the reproduction always remain the same.

When reproducing a pattern by means of the supplemental stylus arm 69—70, the reproduced letters, numerals or characters will always have their vertical centers parallel one with the other.

So long as the pivot screws 84 are upon the same horizontal plane, the vertical lines upon the pattern will cause the corresponding lines upon the reproduction to extend vertically, these vertical lines being the height lines of the reproduction.

When the router 35 is moved into and out of engagement with the work plate, the arm 32 moves about a horizontal axis only as a result of the arrangement of the pivots 84, which movement also compensates for the arc described by the transmitter arm 30 during its movement to reproduce the pattern. If, however, one of the pivots 84 be raised to a different horizontal plane from the other, a slight lateral component will be introduced in the pivotal movement of the arm 32, resulting in a slight lateral deflection of said arm, and consequently, of the router 35, so that the reproduced line will be slightly inclined to the vertical, to an extent according to the degree and the direction of the tilt of the arms of the bracket 85. When adjusting the pivots 84

with relation to the different recesses in the brackets 82 and 83, so as to have these pivots upon different horizontal planes, it is unnecessary to release the nut 36 to turn the stem 36 so as to have the support 33 extend vertically and engage both arms 43 and 44 thereof with the supports 41 and 42.

Work of the character for which the machine of my invention is designed, does not require that precision in the depth of cut or in the width of lines which is required when making plates for printing purposes. Hence the depth of cut need not be regulated with any great nicety, although when the machine is once set, it is apparent that all of the lines in the reproduction will be of substantially the same depth and width. The stop screw 49 may be used to vary the width of the lines produced, an increased depth of cut resulting in an increased width of the lines, and vice versa.

Pivotal movement of the plate 21 by reason of its notched edge, will ensure absolute accuracy in the spacing of graduation lines, although upon panel boards, gauge plates and similar articles, absolute precision is not necessary, even in the spacing of such lines.

It is apparent that if it be desired to have the vertical center lines of the letters, numerals or characters associated with an arcuate graduated scale, parallel, the plate 21 may be used to cause the production of the graduation lines upon the work plate, and this plate 21 may also be used conjointly with the stylus arm 69—70, to reproduce such letters, numerals or characters, the stylus 57 being so set with relation to the arm 70 as to cause the arc in which the letters, numerals or characters are formed, to coincide with that of the graduated scale.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably

mounted in said support, a flexible driving shaft connected with said holder, supports for the work tool actuating arm, means whereby said supports may be moved vertically to permit movement of said arm toward and from said work table, and means whereby the quantity of movement of said supports may be regulated.

2. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, means whereby the pivotal connection between said work tool supporting arm and said transmitter arm may be adjusted axially of said transmitter arm to vary the scale of reproduction, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, supports for the work tool actuating arm, means whereby said supports may be moved vertically to permit movement of said arm toward and from said work table, and means whereby the quantity of movement of said supports may be regulated.

3. An engraving machine embodying therein a pattern support, a work table, means whereby the work table may be vertically adjusted, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, means whereby the pivotal connection between said work tool supporting arm and said transmitter arm may be adjusted axially of said transmitter arm to vary the scale of reproduction, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, supports for the work tool actuating arm, means whereby said supports may be moved vertically to permit movement of said arm toward and from said work table, and means whereby the quantity of movement of said supports may be regulated.

4. An engraving machine embodying

therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to impart movement thereof towards, said work table, and members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity.

5. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to impart movement thereof towards, said work table, members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity, and means whereby movement of said supporting rods toward said work table is limited, to control the depth of cut of the tool.

6. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and

from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to impart movement thereof towards, said work table, members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity, a movable support for said rods, a guide therefor, and a stop screw adapted to engage said guide and adjustably mounted in said support, whereby movement of said supporting rods toward said work table is limited, to control the depth of cut of the tool.

7. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, means whereby the pivotal connection between said supporting arm and said transmitter arm may be adjusted axially of said transmitter arm to vary the scale of reproduction, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to impart movement thereof towards, said work table, members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity, an adjustable stop movable with said rods, and a fixed member adapted to be engaged thereby, whereby movement of said supporting rods toward said work table is limited, to control the depth of cut of the tool.

8. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from

said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, means whereby said work tool supporting arm may be moved toward and from said work table, and adjustable means controlling the operative effect of said last named means, whereby the extent of movement of said tool supporting arm may be limited to secure the desired depth of cut.

9. An engraving machine embodying therein a pattern support, vertically extending columns above same, a cross head adjustably mounted upon said columns, a work table carried by said cross head, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm with the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, a sleeve adjustably mounted upon one of said columns having a projection thereon upon which are formed vertically extending slideways, a slide mounted in said slideways, an arm extending transversely of the machine, parallel supporting rods carried thereby and projecting over said work table, means whereby said sleeve may be adjusted vertically of said column, telescoping means for actuating said slide, a spring acting thereon for normally holding said rods away from said work table, members carried by said tool holder support engaging said rods, whereby with the downward movement of said rods penetration of the work plate by the tool results from the descent of said tool by gravity, and a stop screw carried by said slide, and adapted to engage the extension of the sleeve supporting same, whereby movement of said supporting rods toward said work table is limited to control the depth of cut of the tool.

10. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm in-

intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to impart movement thereof towards, said work table, members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity, and a counter weight acting upon said tool supporting arm to retard the movement of the tool support by gravity.

11. An engraving machine embodying therein a pattern support, a work table, including therein a pivotally supported plate and clamps thereon adapted to engage a work plate thereon, whereby different portions of said work plate by successive angular adjustments of said pivotally mounted plate may be brought within the range of a work tool to cause an arcuate arrangement of the reproduction, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, and means whereby said work tool supporting arm may be moved toward and from said work table.

12. An engraving machine embodying therein a pattern support, a work table, including therein a pivotally supported plate, clamps thereon adapted to engage a work plate thereon, whereby different portions of said work plate by successive angular adjustments of said pivotally mounted plate may be brought within the range of a work tool to cause an arcuate arrangement of the reproduction, said pivotally supported plate having an arcuate edge provided with graduation notches, and locking means co-operating with said notches, whereby said plate may be held in any adjusted position, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a

pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, and means whereby said work tool supporting arm may be moved toward and from said work table.

13. An engraving machine embodying therein a pattern support, suitably supported tracks, a carriage slidably mounted upon said tracks, tracks upon said last named carriage extending at right angles to said first named tracks, a carriage mounted upon said last named tracks, and a work table supported by said last named carriage consisting of a plate carried by said carriage, a pivotally supported plate, clamps thereon adapted to engage a work plate thereon, whereby different portions of said work plate by successive angular adjustments of said pivotally mounted plate may be brought within the range of a work tool to cause an arcuate arrangement of the reproduction, said pivotally supported plate having an arcuate edge provided with graduation notches, and locking means co-operating with said notches, whereby said plate may be held in any adjusted position, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, and means whereby said work tool supporting arm may be moved toward and from said work table.

14. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft con-

5 nected with said holder, means whereby said
work tool supporting arm may be moved toward
and from said work table, a carriage capable
of movement toward and from said
10 pattern support, a supplemental stylus arm
having a sequence of depression adapted to
be selectively engaged by the stylus of said
first named stylus arm, and a universal connection
between said supplemental stylus arm
15 and said carriage, whereby movement of said
supplemental stylus arm longitudinally of
the machine will impart the same quantity of
movement to said first named stylus arm, and
movement of said supplemental stylus arm
20 laterally of the machine will impart the
same lateral movement, or a lesser lateral
movement with a longitudinal component
to said other stylus arm, according to the
depression with which said stylus arm is engaged.

15. An engraving machine embodying
therein a pattern support, a work table, a
pendulous transmitter arm, a universal bearing
for one end of said arm, a stylus arm,
25 pivots connecting said stylus arm to the
other end of said transmitter arm, whereby
the stylus carried by said arm is permitted
to have movement toward and from said
pattern support, a work tool supporting
30 arm, a pivotal connection between said supporting
arm and said transmitter arm intermediate
its ends, whereby said supporting arm
may have movement toward and from
said work table, a work tool support carried
35 by said arm, a work tool holder rotatably
mounted in said support, a flexible driving
shaft connected with said holder, means
whereby said work tool supporting arm
may be moved toward and from said work
40 table, a carriage capable of movement toward
and from said pattern support, a
supplemental stylus arm having a sequence
of depressions adapted to be selectively engaged
by the stylus of said first named
45 stylus arm, a universal connection between
said supplemental stylus arm and said carriage,
whereby movement of said supplemental stylus
arm longitudinally of the machine will impart
the same quantity of movement to
50 movement to said first named stylus arm,
and movement of said supplemental stylus
arm laterally of the machine will impart
the same lateral movement, or a lesser
lateral movement with a longitudinal component
55 to said other stylus arm, according to the
depression with which said stylus
arm is engaged, a support for said universal
connection carried by and adjustable
longitudinally of said carriage, and means
60 whereby the length of said transmitter arm
may be varied to change the longitudinal
component of motion of said first named
stylus arm with lateral movement of the
stylus carried by said supplemental stylus
65 arm.

16. An engraving machine embodying
therein a pattern support, a work table, a
pendulous transmitter arm, a universal bearing
for one end of said arm, a stylus arm,
70 pivots connecting said stylus arm to the
other end of said transmitter arm, whereby
the stylus carried by said arm is permitted
to have movement toward and from said
pattern support, a work tool supporting
75 arm, a pivotal connection between said supporting
arm and said transmitter arm intermediate
its ends, whereby said supporting
arm may have movement toward and from
said work table, a work tool support carried
80 by said arm, a work tool holder rotatably
mounted in said support, a flexible driving
shaft connected with said holder, means
whereby said work tool supporting arm
may be moved toward and from said work
85 table, a carriage capable of movement toward
and from said pattern support, a supplemental
stylus arm composed of two sections,
one of which is axially adjustable with
relation to the other, whereby the machine
90 may be so set as to give increased range
in the curvature of the reproduction, said
adjustable section having a sequence of
depressions adapted to be selectively engaged
by the stylus of said first named stylus arm,
95 and a universal connection between said
supplemental stylus arm and said carriage
whereby movement of said supplemental stylus
arm longitudinally of the machine will
impart the same quantity of movement to
100 said first named stylus arm, and movement
of said supplemental stylus arm laterally of
the machine will impart the same lateral
movement, or a lesser lateral movement with
a longitudinal component to said other stylus
105 arm, according to the depression with
which said stylus arm is engaged.

17. An engraving machine embodying
therein a pattern support, a work table, including
therein a pivotally supported plate
and clamps thereon adapted to engage a
110 work plate thereon, whereby different
portions of said work plate by successive
angular adjustments of said pivotally
mounted plate may be brought within the
range of a work tool to cause an arcuate
115 arrangement of the reproduction, a pendulous
transmitter arm, a universal bearing for one
end of said arm, a stylus arm, pivots
connecting said stylus arm to the other
end of said transmitter arm, whereby the
120 stylus carried by said arm is permitted
to have movement toward and from said
pattern support, a work tool supporting
arm, a pivotal connection between said
supporting arm and said transmitter arm
125 intermediate its ends, whereby said
supporting arm may have movement toward
and from said work table, a work tool
support carried by said arm, a work tool
holder rotatably mounted in said support,
130 a flexible driving shaft connected with said

holder, means whereby said work tool supporting arm may be moved toward and from said work table, a carriage capable of movement toward and from said pattern support, a supplemental stylus arm composed of two sections, one of which is axially adjustable with relation to the other, whereby the machine may be so set as to give increased range in the curvature of the reproduction, said adjustable section having a sequence of depressions adapted to be selectively engaged by the stylus of said first named stylus arm, and a universal connection between said supplemental stylus arm and said carriage, whereby movement of said supplemental stylus arm longitudinally of the machine will impart the same quantity of movement to said first named stylus arm, and movement of said supplemental stylus arm laterally of the machine will impart the same lateral movement, or a lesser lateral movement with a longitudinal component to said other stylus arm, according to the depression with which said stylus arm is engaged.

18. An engraving machine embodying therein a pattern support, a work table, including therein a pivotally supported plate and clamps thereon adapted to engage a work plate thereon, whereby different portions of said work plate by successive angular adjustments of said pivotally mounted plate may be brought within the range of a work tool to cause an arcuate arrangement of the reproduction, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a pivotal connection between said supporting arm and said transmitter arm intermediate its ends, whereby said supporting arm may have movement toward and from said work table, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, means whereby the pivotal connection between said work tool supporting arm and said transmitter arm may be adjusted axially of said transmitter arm to vary the scale of reproduction, vertically movable supporting rods above said work table, means normally holding said rods away from, and adapted to move them towards, said work table, members carried by said tool holder support engaging said rods, whereby penetration of the work plate by the tool results from the descent of said tool by gravity, a carriage capable of movement toward and from said pattern support, a supplemental stylus arm composed of two sections, one of which is axially adjustable

with relation to the other, whereby the machine may be so set as to give increased range in the curvature of the reproduction, said adjustable section having a sequence of depressions adapted to be selectively engaged by the stylus of said first named stylus arm, and a universal connection between said supplemental stylus arm and said carriage, whereby movement of said supplemental stylus arm longitudinally of the machine will impart the same quantity of movement to said first named stylus arm, and movement of said supplemental stylus arm laterally of the machine will impart the same lateral movement, or a lesser lateral movement with a longitudinal component to said other stylus arm, according to the depression with which said stylus arm is engaged.

19. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, a sleeve having diametrically opposite extensions parallel with the axis of said transmitter arm and adjustably mounted upon said arm, said extensions each having a sequence of spaced depressions therein, said tool supporting arm having a forked end, pivot screws carried by the arms of said forked end and adapted to be selectively engaged with the depressions upon said extensions respectively, whereby said supporting arm may have movement toward and from said work table, either about a horizontal axis or an axis oblique to the horizontal, a work tool support carried by said arm, a work tool holder rotatably mounted in said support, a flexible driving shaft connected with said holder, and means whereby said work tool supporting arm may be moved toward and from said work table.

20. An engraving machine embodying therein a pattern support, a work table, a pendulous transmitter arm, a universal bearing for one end of said arm, a stylus arm, pivots connecting said stylus arm to the other end of said transmitter arm, whereby the stylus carried by said arm is permitted to have movement toward and from said pattern support, a work tool supporting arm, consisting of a member having a forked end, a stem mounted in said member and capable of angular adjustment with relation to its axis, and means for locking said stem in any adjusted position, a sleeve having diametrically opposite extensions parallel with the axis of said transmitter arm and adjustably mounted upon said arm, said extensions each having a sequence of spaced depressions

therein, pivot screws carried by the arms of
said forked end and adapted to be selectively
engaged with the depressions upon said ex-
tensions respectively, a work tool support
5 carried by said stem, a work tool holder
rotatably mounted in said support, a flexible
driving shaft connected with said holder,

and means whereby said work tool support-
ing arm may be moved toward and from
said work table.

In witness whereof I have hereunto
affixed my signature this 28th day of Novem-
ber, 1922.

WILLIAM S. EATON.