W. S. EATON.

GEOMETRICAL MACHINE.

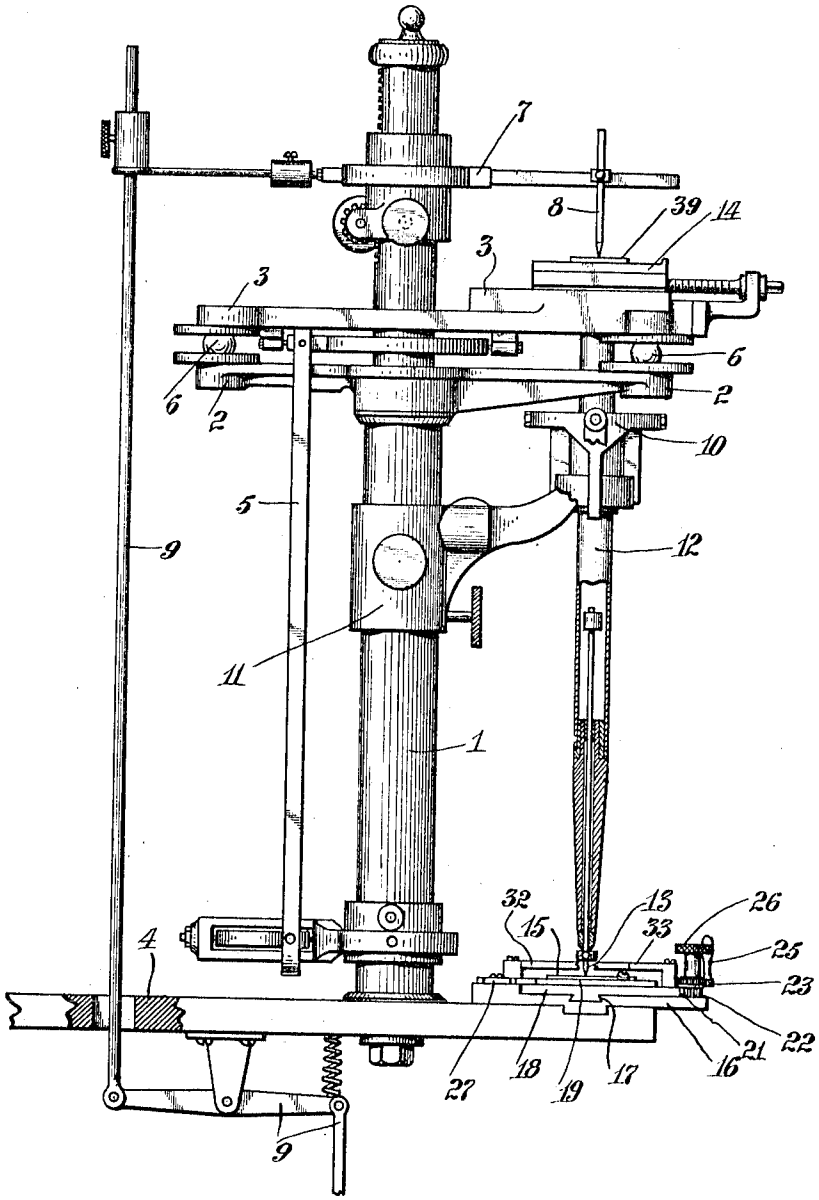
APPLICATION FILED OCT. 23, 1913.

1,241,723.

Patented Oct. 2, 1917.

3 SHEETS—SHEET 1.

Fig. 1.



Attest:

E. Mitchell

Eugene Wining.

William S. Eaton

Inventor:

by Grant T. Wentworth

his Atty.

W. S. EATON.

GEOMETRICAL MACHINE.

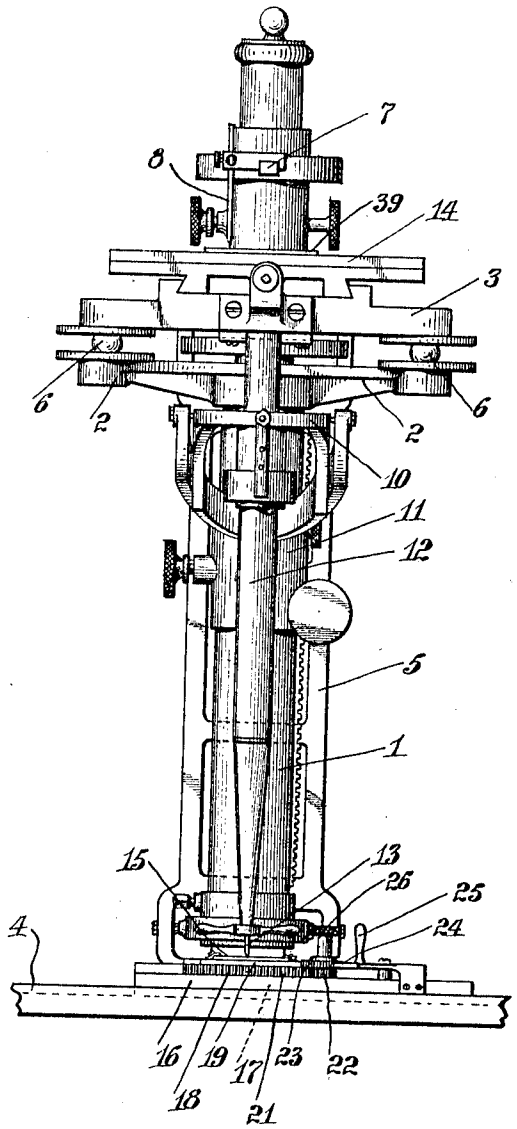
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3 SHEETS—SHEET 2.

Fig. 2.



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GEOMETRICAL MACHINE.

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3 SHEETS—SHEET 3.

Fig. 3.

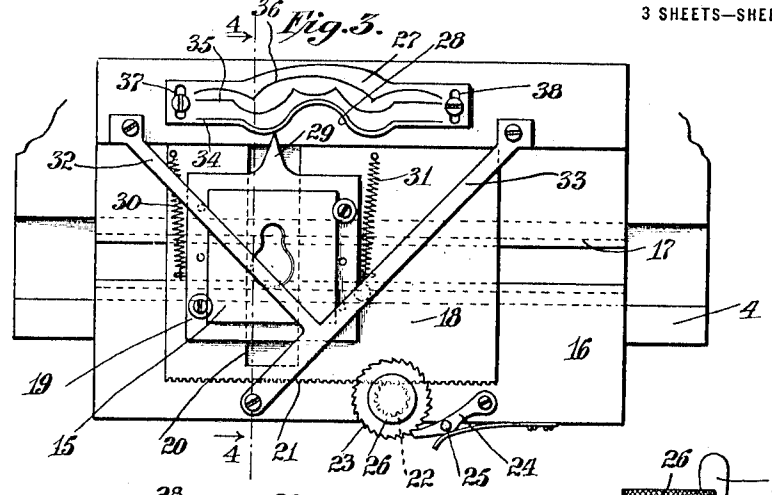


Fig. 4.

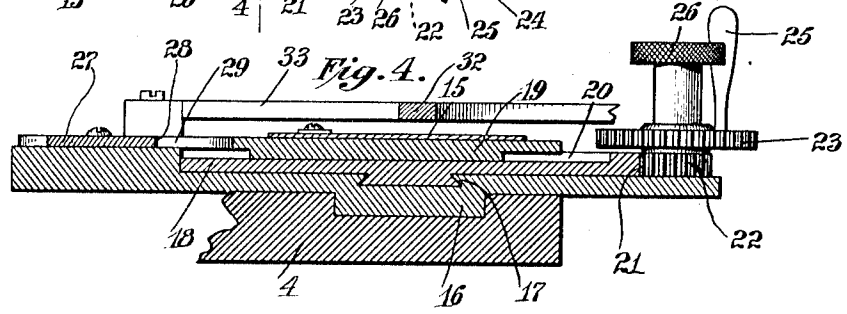
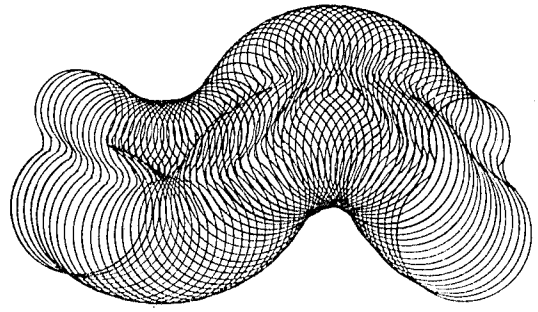


Fig. 5.



Attest:

E. Eugene Wenning.

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by Frank P. Wentworth

his Atty.

UNITED STATES PATENT OFFICE.

WILLIAM S. EATON, OF SAG HARBOR, NEW YORK, ASSIGNOR TO AMERICAN BANK NOTE COMPANY, A CORPORATION OF NEW YORK.

GEOMETRICAL MACHINE.

1,241,723. Specification of Letters Patent. **Patented Oct. 2, 1917.**

Application filed October 23, 1913. Serial No. 796,818.

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 Geometrical 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 geometrical machines, and more particularly to a machine adapted to create intricate designs by means of a master bearing a simple outline, character or base, having as a whole no resemblance to the design to be created or produced.

The main object of my invention is to provide a machine of this character wherein if desired, designs having regular or irregular outlines may be created, and the character of such outlines may, if desired, be varied indefinitely. A further object is to provide a machine of this character, capable of creating from an elementary outline, character or base, either a complex border design, or a complicated geometrical figure, as desired. A still further object is to provide a machine of this character wherein the elementary outline, character or base is adapted to receive a step by step lineal traverse so as to cause similar movement, through the reproducing mechanism, of the work table carrying the work plate or sheet, and wherein, if desired, the direction of this lineal traverse may be varied at different points, in the same or varying degrees, to impart irregularity to the outline of the created design. A still further object is to provide a machine of the character herein described, wherein through the shifting of the work plate or sheet, designs having the general contour of a square or other angular figure may be produced. A still further object is to provide a machine of this character in which the lines at the ends of adjoining sides of the created design may be joined, as by a miter joint, to secure substantial continuity of these lines at the corners, and avoid any substantial deepening of the tone values at such corners. And a still further object is to proide a machine of this character capable of creating line designs with accuracy and precision, the outline and tone values of the created design being determined by the elementary outline, character or base through the coöperation of different parts of the machine, the design being incapable of reproduction excepting through the use of the same elementary outline, character or base, and other parts of the machine which, in conjunction therewith, control the detailed character of the design produced.

The invention consists primarily in a geometrical machine embodying therein a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline character or base may be described upon said work plate or sheet, and means whereby lineal traverse may be imparted to said support for the elementary outline, character or base to effect the spacing of succeeding reproductions thereof; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—

Figure 1 is a side elevation of a machine embodying my invention;

Fig. 2 is a front elevation thereof;

Fig. 3 is a plan view of the support for the elementary outline, character or base, and the actuating means therefor, a plate bearing said elementary outline, character or base being shown in position upon said support;

Fig. 4 is a section on the line 4—4 of Fig. 3; and

Fig. 5 is a fragmentary view of a design created by the machine shown in the drawings.

Like letters refer to like parts throughout the several views.

In the accompanying drawings, I have shown an embodiment of my invention which includes therein the essential characteristics of a well known type of pantographic engraving machine, which in actual use I have found to give highly satisfactory results. This machine, however, is merely

typical of a large number of machines in which my improvement may be incorporated, and if desired, still other and special designs of machines adapted for special uses may be constructed so as to embody the essential characteristics of my invention.

In the following description, I have referred more particularly to the particular type of machine shown in the drawings, it being expressly understood, however, that it is not my intention to in any way limit myself to any particular mechanism for transmitting movement as defined by the elementary outline, character or base, to the mechanism by which the design is produced.

My invention is especially adapted for use in creating designs for, or upon, printing plates, and plates or matrices for use in developing printing plates, which designs may be in the form of a continuous border design, or a line geometrical figure having a general angular contour, to be used in connection with the production of safety papers, such as are used in bank notes, or other negotiable papers or instruments.

Heretofore, these border and figure designs have been made in the same manner as the rosette designs, in part by the use of the rose engine or engine lathe, and in part by hand, portions only of the completed design being used, and the design being finished by hand. Owing to the well known and well defined operative effect of such engines, the border designs have not been widely diversified, and the angular figure designs have usually been created by combining different sections of the mechanical design produced by the rose engine or engine lathe, the labor of producing such designs, as with rosettes, having been extensive and having required a high degree of skill.

By my improved mechanism, I am enabled to secure complex designs, susceptible of wide variation, both as to borders, parts of borders, or angular figures, each of which designs will be complete in itself, and when a plate is made upon a machine, will require no hand finishing.

I am also enabled to mechanically superimpose one design upon another, or to insert a number or word design in the body of a scroll work design, and I am enabled to make a proof design and a completed design in a materially shorter time than is possible with the old rose engine and hand work methods.

In the form of the invention shown in the accompanying drawings, 1 indicates a central column, carrying a bed plate 2 for a movable table 3 adapted to carry the sheet or plate upon which the design is to be formed. Said column is mounted upon the main table 4 of the machine which may be supported in any desired manner. The table 3 is mounted to have universal movement upon a single plane so as to place no limitation upon the movement thereof and thus permit the formation of straight or curved lines in any direction. At 5 I have shown a steadying mechanism to insure absolute accuracy in the movement of the work supporting table 3. At 6 are ball bearing mounts for the table 3 which insure absolute freedom of movement. Mounted upon the column 1 above the work table 3 is a supporting means, as the oscillatory arm 7, for a work point 8, which in the form of the invention shown is an ordinary graver. The oscillatory work point carrying arm is controlled by the link, treadle and lever mechanism 9, this point being adapted to be brought into contact with the work surface through gravity only.

Mounted by means of a universal joint 10 and a vertically adjustable collar 11, upon the column 1, is a transmitter 12, one end of which is adapted to have mounted therein a tracing point or stylus 13, and the other end of which is connected by means of a universal joint, not shown, with the work table 3.

The adjustability of the collar 11 is for the purpose of varying the range of movement of the table as compared with that of the tracing point or stylus. Carried by the work table 3 is a work support 14 having means whereby a plate or sheet may be attached thereto, which means are adapted to be released to permit the adjustment of the plate or sheet on said table to secure the proper placing of the design on said plate or sheet, or the turning of said plate or sheet upon its support, in creating angular figures.

The mechanism above described has been heretofore patented to me by Letters Patent #1,039,714, dated October 1, 1912, and it is not my intention to claim such mechanism broadly at this time. The elements above referred to constitute one type of pantographic engraving machine embodying one character of reproducing means, the mode of operation of which contemplates the exact reproduction of a design or pattern upon any desired scale.

By my present invention, however, I do not reproduce a fixed design, but vary the operation of the above described mechanism in a manner whereby a design is created which as a whole bears absolutely no resemblance to the original design or master.

To secure the desired variance in the operative relation of the work plate or sheet and the plate 15 carrying the elementary outline, character or base, I provide a support for said plate 15 which is capable of and adapted to receive, lineal movement after each reproduction of said elementary outline, character or base, so as to secure the desired spacing of such reproductions to develop a design consisting of a plurality of figures similar to the elementary outline, character or base, the lines of which intersect

each other in a manner to obscure the nature of the elementary outline, character or base, and secure various tone values throughout the created design.

In order to increase the complexity of the design, I also prefer to so construct said support that in addition to a rectilinear movement thereof, simultaneous angular movement may be imparted thereto, for imparting irregularity to the outline of the completed design.

The extent of this angular movement may vary to secure curved effects, as shown in the accompanying drawings, or may be uniform, to secure angular effects. Furthermore, the degree of such irregularity may be varied at will, or such movements may be both regular and irregular, successively and alternately, to impart to the design both curved and angular effects as to the outline thereof.

The main table 4 has fixedly mounted thereon a base plate 16, having a way 17 therein, extending laterally of the machine. Slidably mounted upon the base plate 16, is a plurality of superimposed plates 18 and 19, the former of which is slidably mounted in the way 17, and the later of which is slidably mounted in the ways 20 upon the plate 18, the way 20 extending perpendicularly to the way 17.

By this construction, simultaneous movement of the plate 15, bearing the elementary outline, character or base, in two directions, may if desired, be secured.

To impart the desired lineal traverse to the plate 18, I provide said plate with an extended rack 21, with which the gear 22, carried by the plate 16, is in mesh.

Mounted upon the shaft of this gear is a ratchet wheel 23, coöperating with which is a spring pressed pawl 24, having a release handle 25 by means of which the pawl may be disengaged from this ratchet to permit the reverse rotation of the gear 22 to restore said plate 18 to its starting position.

The gear 22 and ratchet 23 are provided with a knurled operating head 26.

While in practice this mechanism has been found satisfactory, it is not my intention to limit myself to the specific mechanism for imparting a lineal traverse to the support for the elementary outline, character or base. By the mechanism described, however, a step by step movement may be imparted to said support and accuracy as to the quantity of each movement may be secured.

To secure the desired movement of the plate 19, independently of that of the plate 18, I mount upon the base plate 16, a controlling or cam plate 27, having an operative surface 28, coöperating with the contact or bearing 29, carried by and movable with the plate 19.

While in the accompanying drawings, I have shown the controlling or cam plate 27 as having an undulatory or ogee contact surface, the contour of this surface may be varied indefinitely and may be curved or angular, or both, as desired, for the purpose of causing the desired variances in the outline of the created design.

The uppermost plate 19 of the superimposed plates constituting the support for the elementary outline, character or base, is normally forced toward the controlling or cam plate 27 by the springs 30 and 31, extending from said plate to studs carried by the plate 18, so as to cause this plate 19 to follow the rises and falls or straight portions of the controlling or cam plate 27.

The construction heretofore described may be used for making short sections of border designs within the operative range of the transmitter 12; and the contour of the outlines of the designs may be varied by substituting a controlling or cam plate 27 having an operative surface 28 of one contour, for such a plate, the operative surface of which is of a different contour, the changes in such contour being susceptible to wide variation from a rectilinear surface to curved surfaces, angularly extending surfaces, or a combination of any two or all of such surfaces, and the degree of length of such surfaces may also be varied as desired.

When it is desired to use the mechanism herein described, for developing angular figures, or for forming corners of a border design, I mount upon the base plate 16, a bridge having divergent arms, 32—33, of the desired angle, which arms project over the superimposed plates 18 and 19 in a manner to permit a free movement of these plates thereunder while serving as a stop for determining the starting and stopping points of the stylus with relation to the elementary outline, character or base in a manner to limit the quantity of said outline, character or base reproduced at the angles of the created figure. When it is desired to produce a design having a general outline of a quadrilateral figure, the arms 32 and 33 are set upon the base plate 16 so as to project the pattern 15 in the path of the stylus so as to define the beginning and end of each line. By this means the complete reproductions of the master or base will be prevented by the engagement of the stylus with said arms respectively, the quantity of reproduction at opposite ends being gradually increased or decreased as the master or base passes under or from under said arms respectively. The number and arrangement of lines at each end of the design will be the same, but the design will be cut off at an angle of 45°, and hence, by turning the work plate or sheet one quarter of a turn, and duplicating the design, already thereon, a perfect

miter joint will be formed, the lines of which at the adjoining sides will be in exact register, even though none of these lines may be great.

Furthermore, the number of lines upon each side will be the same, and the tone values at this point will be the same as throughout the rest of the design.

If it be desired to develop a design having other than four sides a bridge may be used in which the angle between the arms 32 and 33 will be more or less than 90° but the circular movement of the work plate, to bring it to position to produce each side of the figure, must correspond in degrees with the degrees of the angle between the said arms. For example, if a hexagonal figure is required arms, the angle of divergence of which is 60°, will be used and the plate will be turned 60° upon completion of one side preparatory to beginning work upon the adjoining side.

When the mechanism herein described is being used for creating angular designs, the fact that the stylus starts and stops at a different point of the elementary outline, character or base each time, prevents the making of a continuous outline upon the work by holding the work point in engagement with the work plate or sheet when effecting the spacing of succeeding reproductions. Hence, I provide the controlling or cam plate 27 with a guide line, as 34, following the contour of the contact surface 28 so that after one side of a figure is completed, an outline line may be added thereto. Said controlling or cam plate may also be provided with other guide lines, as 35 and 36, which may be used for running lines through the body of the created designs, thus serving to still further complicate the design.

The controlling or cam plate 27 is detachably mounted upon the base plate 16 so that it may be readily removed or applied thereto, a construction which facilitates the substitution of one such controlling or cam plate for another.

The said plate is also provided with elongated slots 37 and 38, so as to permit said plate to be adjusted toward or from the plate 18, and thus permit the same design to be twice produced in the parallel relation, with parts thereof only superimposed upon each other. As a rule, however, a sufficiently complicated design may be created without using this adjustment.

If it be desired, however, to complicate the design, this may also be done by varying the scale of the reproduction by means of the collar 11, or by using elementary outlines, characters or bases, of different dimensions, and superimposing the design created from one upon that created from another.

The work plate or sheet is indicated at 39.

The operation of the herein described device is substantially as follows:—

The work plate or sheet 39 having been mounted upon the plate 19, the stylus 13 is caused to follow said outline, thus causing a similar movement of said work table 3 through the transmitter 12. Prior to the movement of the transmitter, the treadle and link mechanism 9 is used to force the work point 8 into engagement with the work plate or sheet. After one reproduction of the elementary outline, character or base upon the work plate or sheet 39, the point 8 is raised out of engagement with the said plate, and the gear 22 turned to advance the plates 18 and 19 a distance of one or more teeth on the ratchet 23.

The stylus 13 is then brought to the right to its former starting point upon the elementary outline, character or base, the result being the spacing of the table 3 and the work plate or sheet through the transmitter mechanism, so as to bring the work plate or sheet into a different relation to the work point 8. This point is then again brought into engagement with the work plate or sheet, and the elementary outline, character or base again reproduced thereon. This operation is successively repeated within the range of movement of the table 18 or of the transmitter 12, the elementary outline, character or base being fed forward lineally after each reproduction thereof.

When the design is completed, it will be a simple border design, the lines of which will intersect in a manner to obscure the nature of the elementary outline, character or base used.

If a straight outline design is required, a controlling or cam plate 27 having a straight edge may be used, but if it is desired to have an irregular contour or outline to the created design, a controlling plate or cam 27 having an operative surface 28 including therein curved or angular portions, with or without intervening straight portions, may be used, although it is to be understood that the outline of the design will not be in exact accord with that of the contact surface of the controlling or cam plate because this will be modified in great measure by the character of the elementary outline, character or base.

When a cam plate having rises and falls is used, each rectilineal feeding movement of the plate 18 will result in a rectangular movement of the plate 19 under its springs 30 and 31, the extent of this movement being defined by the character of the contact surface 28 of the controlling or cam plate 27.

When the contour of the operative surface 28 is curved, the extent of this angular movement of the plate 19 will vary with succeeding feeding movements, even though these feeding movements in themselves, be

regular. Hence, the effect is to give the created figure an outline in the nature of a curve. When, however, the rises and falls are angular, the extent of the angular movement of the plate 19 with each feeding movement will be the same, and the effect will be an angular contour in the created design.

The nature of the created design is complex, and difficult if not impossible to reproduce by hand, as it will consist of a great number of intersecting lines, and the design in its entirety will have different tone values, from the deep tone of the edges to very light tones toward the center.

Furthermore, if desired, words or numerals may be superimposed directly upon a created design, thus removing parts of the intersecting lines, and making identification of the elementary outline, character or base used more difficult.

In some lines of safety paper work, it is desirable to produce figures, which in a general way are quadrilateral, although the outlines are irregular. When it is desired to create such a design, by means of this machine, the bridge having the divergent angular arms, 32 and 33, is mounted upon the plate 16, with the said arms extending over and across the plate 19. This plate is then brought to the left, Fig. 3, until a portion of the elementary outline, character or base extends beneath the arm 32. The stylus 13 is then brought into position in engagement with that point of said elementary outline, character or base, which will cause said stylus to bear upon the arm 32, and the part of the outline exposed within said arms is traced so as to reproduce only that portion upon the work plate or sheet 39. The plate 18 is then fed forwardly by means of the gear 22, in the manner heretofore referred to, and the stylus 13 again brought into engagement with the elementary outline, character or base, and against the arm 32, and the exposed portion of the figure within the arm 32 and the arm 33, is again traced, this operation being repeated until ultimately the entire elementary outline, character or base is exposed within the arms 32 and 33. By succeeding feeding movements, this elementary outline, character or base will pass in successive steps under the arm 33, and under such conditions, the manner of tracing will be reversed, the stylus 13 with each tracing operation, starting from contact with the arm 33 and ending in contact with said arm 33.

When the completed elementary outline, character or base has passed below the arm 33, so that no portion thereof is exposed between said arm and the arm 32, the work plate or sheet 39 is turned upon its support 14, one quarter turn in the form of the invention shown in the drawings, and the plates 18 and 19 are restored to their former position and the operations above referred to repeated.

The arms 32 and 33 projecting with the same degree of obliqueness, and in divergent directions, it is apparent that the mutilated sections at the ends of the created design will be dissimilar or will constitute opposite halves of one unmutilated design, built up of the same number of reproductions of the elementary outline, character or base, so that in reproducing the design with the mutilated ends, a perfect miter joint effect may be secured at the corners, the lines of which will meet and accurately register.

In this manner, a quadrilateral figure may be produced although the outlines need not be straight, as by using a controlling or cam plate 27 the outlines of the figure may be modified in the manner above referred to.

When creating an angular figure, the elementary outline, character or base may be of a height as compared with the length of the sides of the figure, to cause the lower portion thereof to cross the center of the figure, thus multiplying the number of lines at the center of the design and varying the tone values at this point, and creating a distinct center design, the character of which center design, as well as that of the outline of the figure, depending upon the contour of the operative surface of the controlling or cam plate, and the contour of the top and bottom of the elementary outline, character or base.

Throughout this specification when referring to an elementary outline, character or base, I contemplate a geometrical figure or an incomplete geometrical figure as distinguished from mere straight or curved lines, the outline of which figure taken as a base and repeatedly reproduced in the manner determined by the controlling or compelling mechanism will create, form or constitute the completed intricate geometrical design.

By the term work plate or sheet as used in the specification, I contemplate a metallic plate from which portions of the metal are to be actually removed; a copper plate coated with resist, to be removed preparatory to an acid etching process; proof glass or paper upon which a design may be made to determine the suitability thereof before making a plate; matrices from which a cast is to be made, or any other substance or material adapted to receive in any manner whatsoever, a design. By the term work point is to be included any instrument or implement for marking, cutting or scratching upon any material.

The bridge embodying the arms 32 and 33 being removable, the machine may be used as a border machine or for creating eccentric geometrical figures.

In describing the operation of the ma-

chine, I have referred more particularly to the mode of operation which I have found satisfactory in use, but it is apparent that the nature of the design created may be varied by changes in the extent to which the stylus is caused to travel over the elementary outline, character or base, and variances in the spacing of succeeding reproductions of the same.

It is not my intention to limit myself 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 my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A geometrical machine embodying a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, and means whereby lineal traverse may be imparted to said support for the elementary outline, character or base to effect the spacing of succeeding reproductions thereof.

2. A geometrical machine embodying a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means whereby lineal traverse may be imparted to said support for the elementary outline, character or base to effect the spacing of succeeding reproductions thereof, and means whereby the direction of said traverse may be varied.

3. A geometrical machine embodying a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, a rack carried by and movable with said first named support, a gear meshing with said rack, means whereby said gear may be intermittently actuated, and a pawl and ratchet mechanism acting upon said gear, whereby lineal step by step traverse may be imparted to said support for the elementary outline, character or base, to effect the spacing of succeeding reproductions thereof.

4. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means imparting movement to the lowermost of said superimposed plates in one direction, and means defining the movement of the uppermost of said plates in another direction, whereby the direction of traverse of the elementary outline, character or base is varied.

5. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means imparting movement to the lowermost of said superimposed plates in one direction, a controlling or cam plate mounted in a fixed position adjacent the uppermost of said superimposed plates, a contact carried by said last named plate, and means whereby said contact is held in normal engagement with said controlling or cam plate.

6. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means imparting movement to the lowermost of said superimposed plates in one direction, a controlling or cam plate, means whereby said controlling or cam plate may be detachably mounted in a fixed position adjacent the uppermost of said superimposed plates, whereby a controlling or cam plate having an operative surface of one contour may be substituted for one having a different operative surface or contour, a contact carried

by the uppermost of said superimposed plates, and means whereby said contact is held in normal engagement with said controlling or cam plate.

7. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means imparting movement to the lowermost of said superimposed plates in one direction, a controlling or cam plate mounted in a fixed position adjacent the uppermost of said superimposed plates, said controlling or cam plate being adjustably mounted upon said support for the elementary outline, character or base whereby said plate may be adjusted toward and from said supporting plate, a contact carried by said last named plate, and means whereby said contact is held in normal engagement with said controlling or cam plate.

8. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, a rack carried by and movable with the lowermost of said plates, a gear meshing with said rack, means whereby said gear may be intermittently actuated, and a pawl and ratchet mechanism acting upon said gear, whereby lineal step by step traverse may be imparted to said support for the elementary outline, character or base, to effect the spacing of succeeding reproductions thereof, a controlling or cam plate mounted in a fixed position adjacent the uppermost of said superimposed plates, a contact carried by said last named plate, and means whereby said contact is held in normal engagement with said controlling or cam plate.

9. A geometrical machine embodying a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base, and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, and an abutment operative upon said reproducing mechanism, whereby the reproduction of portions of said elementary outline, character or base is prevented at predetermined points of the created design.

10. A geometrical machine embodying a support for an elementary outline, character or base, a support for a work plate or sheet, a work point, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point, whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means whereby lineal traverse may be imparted to said support for the elementary outline, character or base to effect the spacing of succeeding reproductions thereof, and a bridge mounted adjacent to, and having divergent arms projecting over said support for the elementary outline, character or base, whereby the reproduction of portions of said elementary outline, character or base is prevented at opposite ends of the created design, and an angular geometrical figure having mitered corners may be produced.

11. A geometrical machine embodying a support for a work plate or sheet, a work point, a support for an elementary outline, character or base, comprising a plurality of superimposed plates adapted to have simultaneous movement in directions perpendicular to each other, means adapted to follow said elementary outline, character or base and cause relative movement of said support for a work plate or sheet and said work point whereby a reproduction of said elementary outline, character or base may be described upon said work plate or sheet, means imparting movement to the lowermost of said superimposed plates in one direction, means defining the movement of the uppermost of said plates in another direction, whereby the direction of traverse of the elementary outline, character or base is varied, and a bridge mounted adjacent to, and having divergent arms spanning said support for the elementary outline, character or base whereby the reproduction of portions of said elementary outline, character or base is prevented at opposite ends of the created design, and an angular geometrical figure having mitered corners may be produced.

12. A geometrical machine embodying a support for a work plate or sheet capable of universal movement upon a single plane, a support for a work point adjacent thereto, a work point carried thereby, means whereby said support for said work point may be actuated to bring said point into or out of

engagement with the work plate or sheet, a support for an elementary outline, character or base, comprising a plurality of superimposed plates, means whereby movement may be imparted to the lowermost of said plates in one direction to effect the spacing of succeeding reproductions, means whereby the uppermost of said plates is adapted to have movement perpendicularly of the movement of the lowermost of said plates, a controlling or cam plate for defining the movements of the uppermost of said plates, a transmitter adapted to carry a stylus for tracing the elementary outline, character or base, and to impart movement to said work table, and means whereby the scale of reproduction may be adjusted.

In witness whereof, I have hereunto affixed my signature, in the presence of two subscribing witnesses, this 2d day of October, 1913.

WILLIAM S. EATON.

Witnesses:
WM. R. REIMANN,
E. P. EATON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."