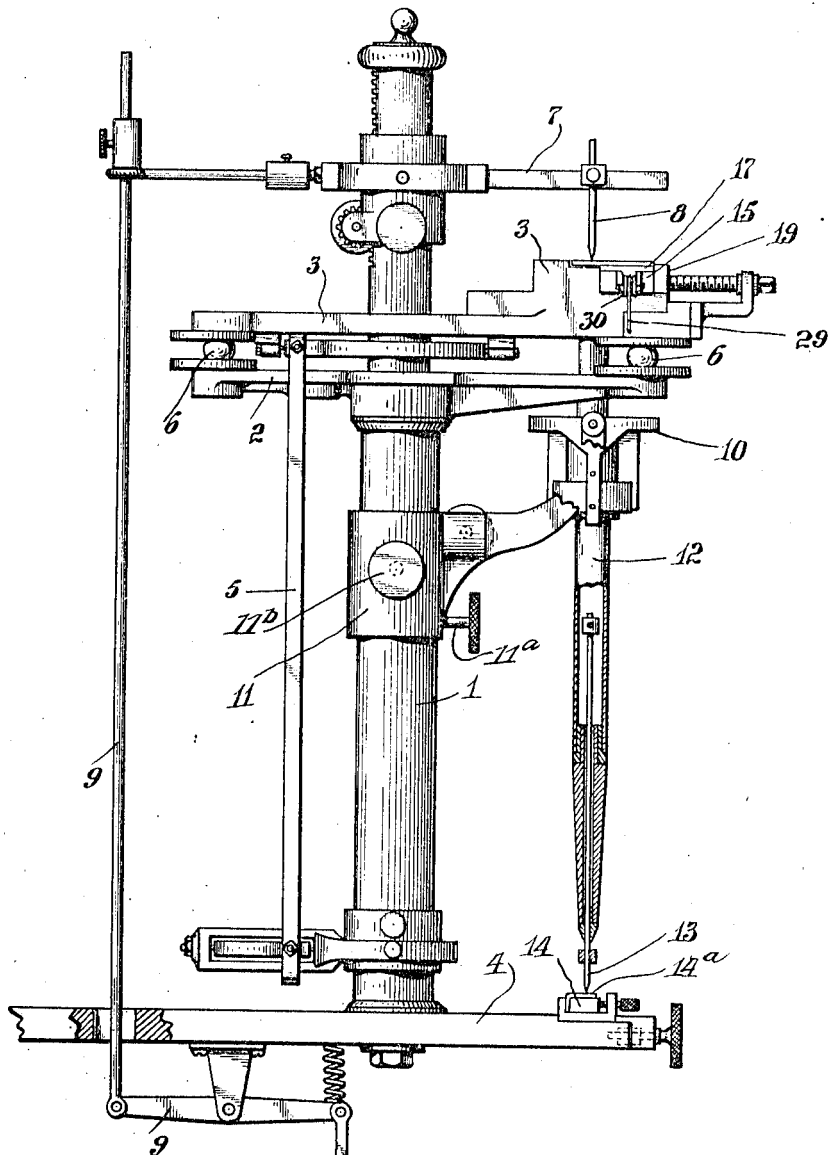


W. S. EATON.
GEOMETRICAL MACHINE.
APPLICATION FILED OCT. 23, 1913.

1,241,721.

Patented Oct. 2, 1917.
3 SHEETS—SHEET 1.

Fig. 1.



Attest:
Ernest W. Waring
Ernest W. Waring

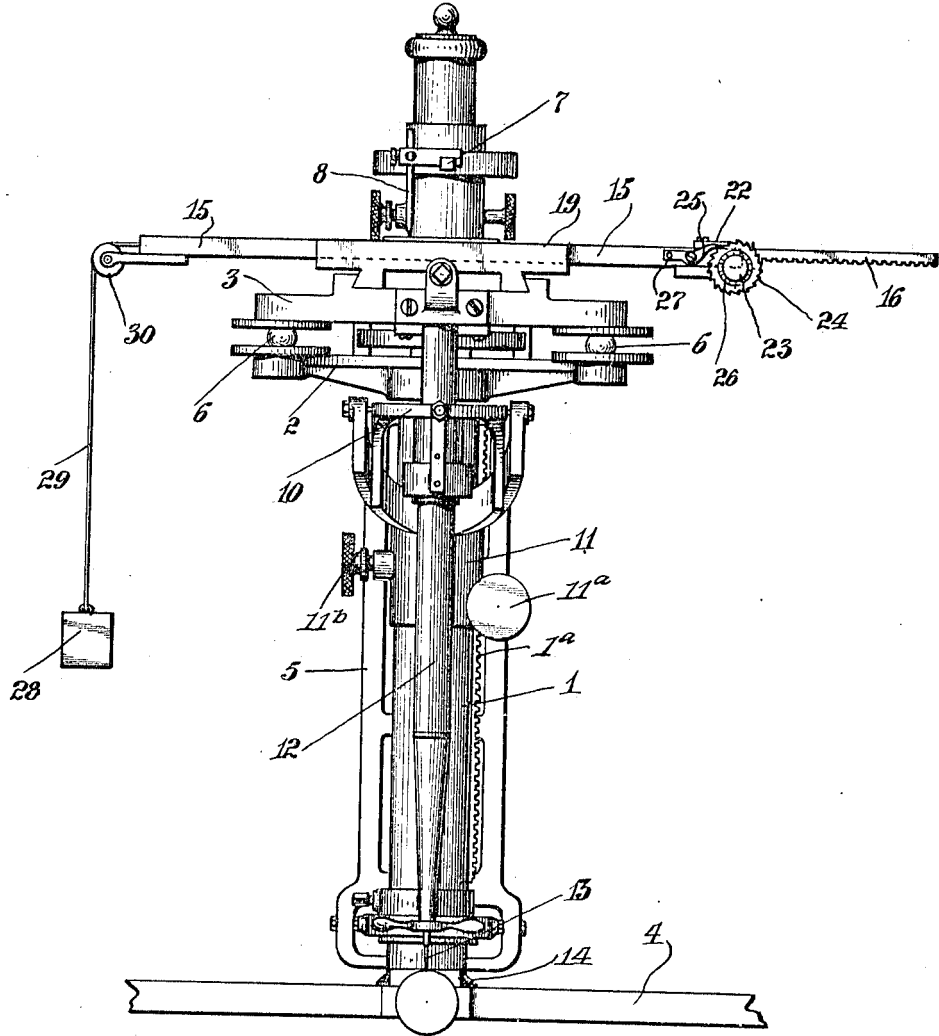
William S. Eaton Inventor:
by *Charles P. Winton*
his Atty.

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3 SHEETS—SHEET 2.

Fig. 2.



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 3 SHEETS—SHEET 3.

Fig. 3.

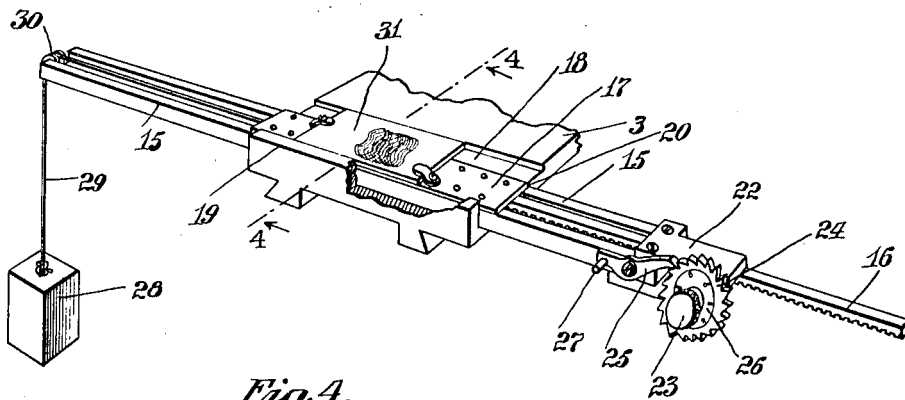


Fig. 4.

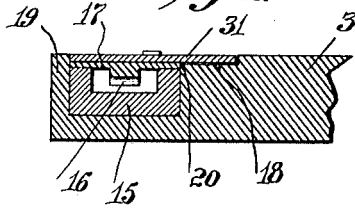


Fig. 5.

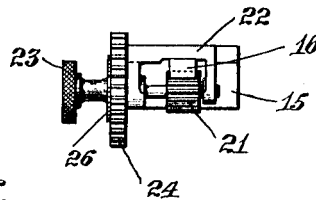


Fig. 6.

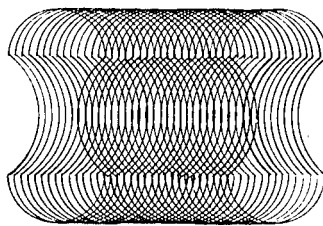
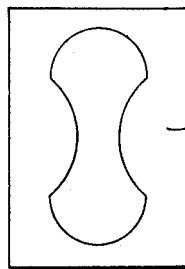


Fig. 7.



Attest:
E. W. M. [Signature]
Eugene W. [Signature]

William S. Eaton
 Inventor:
 by *F. P. [Signature]*
 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.

1,241,721.

Specification of Letters Patent.

Patented Oct. 2, 1917.

Application filed October 23, 1913. Serial No. 796,816.

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 geometrical machine capable of producing a continuous elongated design, especially adapted for use in borders or panels. A further object is to provide a machine of this character wherein the design produced may be of unlimited length, or of a length in excess of the normal capacity, or operative range, of the reproducing mechanism entering into the machine. A still further object is to provide a machine wherein the reproductions of the design of the outline, character or base, may be made with overlapping portions to develop the desired intricate design, and the extent of overlap may be made uniform or varied to increase the intricacies of the design produced. A still further object is to provide a machine wherein the reproduced design may be made with or without an outline or border line, as desired. A still further object is to provide a machine of this character wherein the dimensions of the reproductions of the elementary outline, character or base may be varied without disturbing the adjustment of the means determining the general character of the completed design. And a still further object is to provide a machine wherein the work after each actuation of the reproducing mechanism may be advanced to the desired, and a definite, extent, and be held firmly in position in a manner to insure accuracy in the reproduction of the elementary outline, character or base, thereon.

The invention consists primarily in a geometrical machine embodying therein a fixed support for an elementary outline, character or base, a movable support for a work plate or sheet, means whereby a step by step lineal traverse may be imparted to said movable support, and reproducing means including therein a work point, a tracing stylus adapted to cooperate with said elementary outline, character or base and supporting means for said stylus adapted to impart relative movement to said movable support and said work point as determined by said elementary outline, character or base, whereby a reproduction of said elementary outlines, character or base may be described upon a work plate or sheet, succeeding reproductions of said outlines, character or base being spaced apart by said means imparting lineal traverse to said movable support, 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 view thereof;

Fig. 3 is a detail perspective view of the support for the work plate or sheet;

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

Fig. 5 is an end view of said support;

Fig. 6 is a fragmentary showing of a portion of a border design created by means of my herein described machine; and

Fig. 7 is a detail view showing the elementary outline, character or base from which said design is developed.

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 purposes and 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 specific 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 are in the form of continuous or interrupted borders, to be used in connection with the production of "safety" paper such as is used in bank note or other negotiable papers or instruments.

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

By my improved mechanism, I am enabled to secure complex designs susceptible of wide variations, 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 as by inserting a number or word design in the body of a scroll work design, and further, am enabled to make a proof design and a completed design in a shorter time than is possible by the old rose engine and hand work method.

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 sup-

porting 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 oscillating 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 collar 11 is adjusted by means of the rack 1^a upon the column 1 and a gear meshing therewith and carried by the spindle 11^a mounted in bearings on said collar. The said collar is set in its adjusted position by means of the clamp screw 11^b.

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.

The mechanism above described has been heretofore patented to me by Letters Patent #1,039,714 of 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.

This mechanism comprises a stationary support 14, carried by the main table 4, which support is adapted to have immovably secured thereto a plate 14^a, having indicated thereon as by a sunken line, an elementary outline, character or base, in a position where it will be within the operative range of the stylus 13.

The reproducing mechanism which includes the transmitter 12, the members interposed between same and the work table 3, and the parts appurtenant thereto, respectively, is adapted to impart such a movement to the said table 3 as will cause the reproduction of said elementary outline, character or base upon the plate or sheet by the agency of said work point 8, upon any

desired scale, and with exactitude or distortion, as determined by the adjustment of the transmitting mechanism.

In order to insure the development of a complex line design from the repeated reproduction of said elementary outline, character or base, it is necessary to secure variance in the relative positions of the outline, character or base, and the work plate or sheet upon which the same is being reproduced.

To permit the extension of the border design to any desired length, within the capacity of the machine, I prefer to impart lineal traverse to the support for the work plate or sheet, as this permits an extension of the border to a point beyond the operative range of the stylus point 13 in following said outline, character or base if such were moved. It is also necessary in imparting this traverse to the work plate or sheet, that this movement be a step by step movement, in order to secure the desired overlapping of succeeding reproductions and the proper spacing of the lines.

In carrying out my invention, I provide the work table 3 with a laterally elongated channel piece 15, in which is mounted a slidable rack 16, having fixed thereto a plate 17 bearing upon the top of said channel piece. The table 3 is provided with a recess 18, providing clearance for a work plate or sheet mounted upon said plate, the height of the channel piece 15 being such as to present shoulders 19 and 20 on said table between which the plate 17 is adapted to slide. The channel piece 15 has no movement relative to the work table 3. The rack 16 and plate 17 are adapted to have movement imparted thereto by means of a gear 21 carried by the channel piece 15, the top bearing plate 22 preventing vertical displacement of said rack.

The gear 21 is actuated by means of the knurled stem 23 carried by the shaft thereof.

To insure the uniform step by step feeding movement of the work plate or sheet supporting plate 17, I mount upon the shaft of the gear 21, a ratchet wheel 24, cooperating with the spring pressed pawl 25. To aid in the control of the distancing of succeeding reproductions, I provide said ratchet with a disk 26 having index numbers thereon so that the operator may turn said ratchet one, or a plurality of, teeth, upon each actuation thereof and be able to duplicate the quantity of movement upon succeeding actuations thereof.

The disk 26 is merely to afford visual means for determining the operative effect of the gear 21 in much the same manner as the dial when a permutation lock is used.

The pawl 25 is provided with a release grip 27, to permit a reverse rotation of said

ratchet wheel in restoring the plate 17 to normal. To insure accuracy in the stoppage of the plate 17 and avoid a tendency of said plate to overrun with the actuation of the said pinion 21, I provide a resistance device against which said plate is moved, which device in the form of the invention shown, comprises a weight 28, and a cord 29, extending therefrom and about the pulley 30, to the said rack 16.

The work sheet or plate is shown at 31.

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

A work plate or sheet 31 having been mounted upon the plate 17, in any desired manner so as to be movable therewith, the stylus 13 is brought into engagement with the elementary outline, character or base, and the treadle mechanism 9 actuated to bring the work point 8 into operative engagement with said work plate or sheet.

The stylus is then passed once around the elementary outline, character or base, and the contour thereof will be reproduced upon said plate 31.

If it be desired to form an outline or border line upon the design produced, the point is held in contact with the plate while the handle 27 is actuated to turn the pinion 21 and advance the work plate a distance as determined by one or more of the teeth of the ratchet 24, the weight 28 holding said ratchet in engagement with said pawl so as to prevent any overrunning of said rack and bringing the said plate 17 to a positive stop. The stylus 13 is then used to again reproduce the design, the design overlapping the preceding design slightly so that by a repetition of these operations, a design will be produced which will have various tone values and will consist of a complex intermingling of lines. The nature of this design will depend entirely upon the character of the elementary outline, character or base, as will also the tone values and general effect of the created design.

The design created will be such that it cannot be reproduced by any machine of a type other than that herein described. In white line work, the exact character of the elementary outline character or base from which any design is developed is difficult to determine, and the completed design is extremely difficult to reproduce by hand, by reason of the different tone values therein. In Fig. 6 of the drawings, I have shown a portion of a border produced by a machine made in accordance with my invention, illustrating the general effect, and in this figure the difficulties of hand reproduction, even on an enlarged scale, are apparent.

If desired, the means for imparting a step by step movement to the support for the work plate or sheet shown in this applica-

tion may be incorporated in and used in conjunction with the machine described in my application for Letters Patent Serial No. 749,616, filed February 20, 1913, so as to permit rosettes and border sections to be alternately reproduced by one and the same machine in a continuous design.

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, will create, form, or constitute a complete, complex geometrical design.

By the term work plate or sheet as used in this 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 matter adapted to receive in any manner whatsoever, a design.

By the term work point is to be included any implement or instrument for marking, cutting or scratching upon any material.

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 my 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 fixed support for an elementary outline, character or base, a movable support for a work plate or sheet, means whereby a step by step lineal traverse may be imparted to said movable support, and reproducing means including therein a work point, a tracing stylus adapted to cooperate with said elementary outline character or base, and supporting means for said stylus adapted to impart relative movement to said work point and said movable support as determined by said elementary outline, character or base, whereby a reproduction of said elementary outline, character or base may be described upon a work plate or sheet, succeeding reproductions of said outline, character or base being spaced apart by said means imparting lineal traverse to said movable support.

2. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable support for a work plate or sheet, reproducing means em-

bodying a member adapted to follow said elementary outline, character or base, and impart similar movement to said support, a carrier, a work point supported by said carrier, and means whereby said carrier may be actuated to intermittently bring said point into engagement with the work plate or sheet or hold it in engagement therewith, and means whereby a step by step lineal traverse may be imparted to said support.

3. A geometrical machine embodying a fixed support for an elementary outline, character or base, a work table universally movable upon a single plane, an oscillatory transmitter, adapted to carry a stylus adapted to follow said elementary outline, character or base and transmit similar movement to said work table, an adjustable pivotal support for said transmitter, whereby the scale of reproduction may be varied, a support for a work plate or sheet, slidably mounted upon said work table, a carrier, a work point supported by said carrier, and means whereby a step by step lineal traverse may be imparted to said support independently of said transmitter.

4. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable work table adapted to have universal movement upon a single plane, a work point, a transmitter, a stylus carried by said transmitter adapted to follow said elementary outline, character or base whereby said work table is actuated in accordance with said elementary outline, character or base and a reproduction of said elementary outline, character or base may be described upon a work plate or sheet, a lineally movable support for said work plate or sheet mounted upon said work table, a rack and gear mechanism acting upon said last named support whereby lineal traverse may be imparted thereto independently of said transmitter and succeeding outlines described upon said work plate or sheet will be spaced apart, and means whereby accuracy or uniformity in succeeding feeding movements of said support by said rack and gear mechanism may be secured.

5. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable work table adapted to have universal movement upon a single plane, a work point, a transmitter, a stylus carried by said transmitter, adapted to follow said elementary outline, character or base whereby said work table is actuated in accordance with said elementary outline, character or base, and a reproduction of said elementary outline, character or base may be described upon a work plate or sheet, a lineally movable support for said work plate or sheet mounted upon said work table, a rack and gear mechanism acting upon

said last named support whereby lineal traverse may be imparted thereto independently of said transmitter, and succeeding outlines described upon said work plate or sheet will be spaced apart, a ratchet wheel carried by said gear, and a spring pressed pawl carried by said work table, whereby accuracy or uniformity in succeeding feeding movements of said support by said rack and gear mechanism may be secured.

6. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable work table adapted to have universal movement upon a single plane, a work point, a transmitter, a stylus carried by said transmitter adapted to follow said elementary outline, character or base whereby said work table is actuated in accordance with said elementary outline, character or base and a reproduction of said elementary outline, character or base may be described upon a work plate or sheet, a lineally movable support for said work plate or sheet mounted upon said work table, a rack and gear mechanism acting upon said last named support whereby lineal traverse may be imparted thereto independently of said transmitter, and succeeding outlines described upon said work plate or sheet will be spaced apart, a ratchet wheel carried by said gear, a spring pressed pawl carried by said work table, whereby accuracy or uniformity in succeeding feeding movements of said support by said rack and gear mechanism may be secured, and a resistance device adapted to prevent overrunning of said ratchet relatively to said pawl.

7. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable work table adapted to have universal movement upon a single plane, a work point, a transmitter, a stylus carried by said transmitter adapted to follow said elementary outline, character or base, whereby said work table is actuated in accordance with said elementary outline, character or base and a reproduction of said elementary outline, character or base may be described upon a work plate or sheet, a lineally movable support for said work plate or sheet mounted upon said work table, a rack and gear mechanism acting upon said last named support whereby lineal traverse may be imparted thereto independently of said transmitter, and succeeding outlines described upon said work plate or sheet will be spaced apart, a ratchet wheel carried by

said gear, a spring pressed pawl carried by said work table, whereby accuracy or uniformity in succeeding feeding movements of said support by said rack and gear mechanism may be secured, a movable weight, and a connection between said weight and said movable support, whereby overrunning of said ratchet relatively to said pawl is prevented.

8. A geometrical machine embodying a fixed support for an elementary outline, character or base, a movable work table, for a work plate or sheet, adapted to have universal movement upon a single plane, a work point, a transmitter, a stylus carried by said transmitter, adapted to follow said elementary outline, character or base, whereby said work table is actuated in accordance with said elementary outline, character or base, and a reproduction of said elementary outline, character or base may be described upon a work plate or sheet and means whereby lineal traverse may be imparted to said work table independently of said transmitter to space succeeding outlines described upon a work plate or sheet apart comprising a channel piece carried by said work table, a rack seated within the channel of said channel piece, a support slidably mounted upon said channel piece and connected with said rack, a manually operative gear carried by said channel piece and cooperating with said rack, means carried by said channel piece adjacent said gear whereby displacement of said rack by said gear is prevented, a ratchet wheel carried by said gear, a spring pressed pawl carried by said channel piece, cooperating with said ratchet, whereby accuracy or uniformity in succeeding feeding movements of said support by said rack and gear mechanism is secured, a movable weight, and a flexible connection between said weight and said support, whereby an overrunning of said ratchet relatively to said pawl is prevented, and a back spacing of said support is secured in case of an excessive feeding movement thereof under said rack and gear mechanism.

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.