Oct. 18, 1932. J. WHITAKER 1,883,204

SIGNATURE MACHINE

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Fig. 1

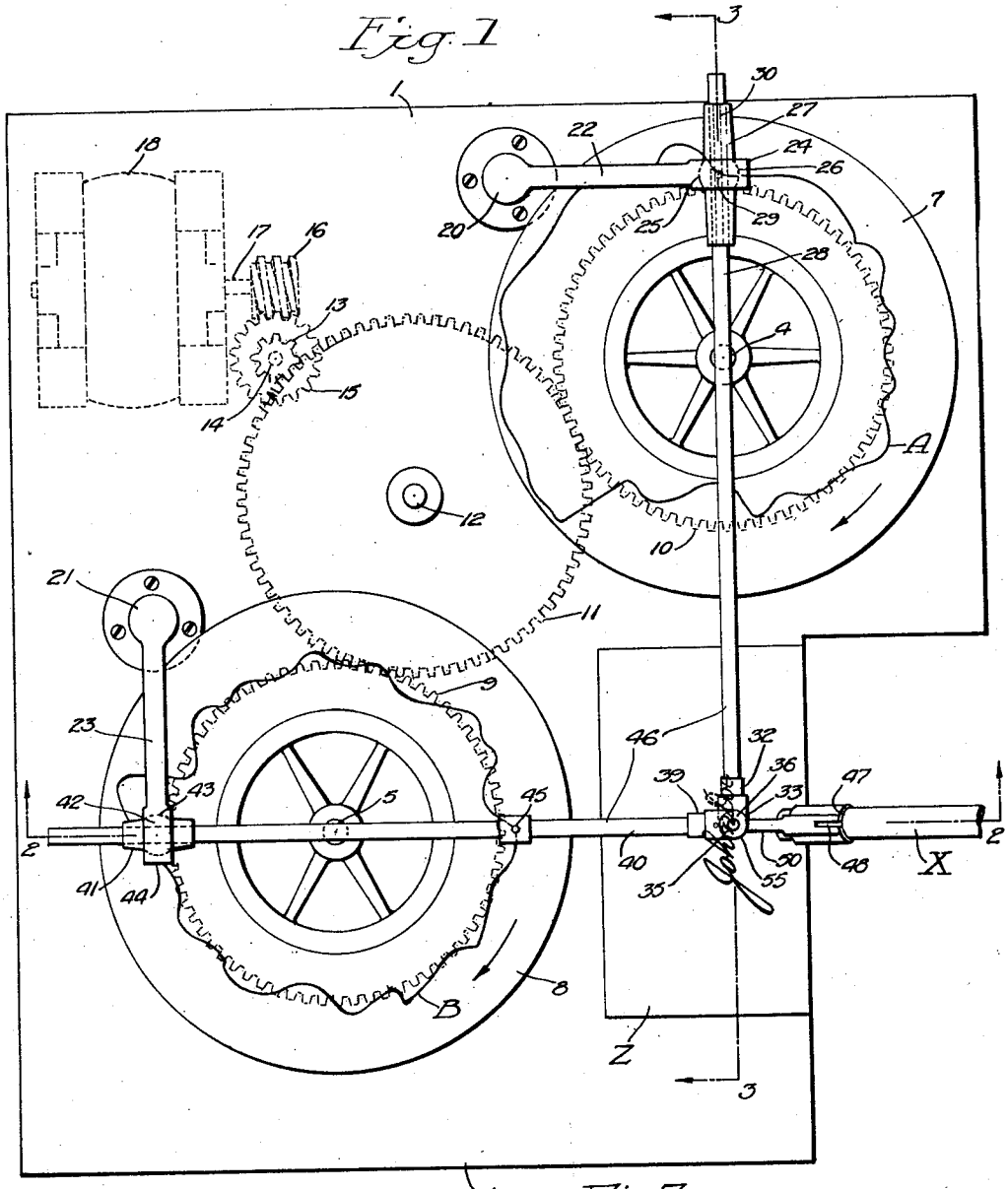


Fig. 4.

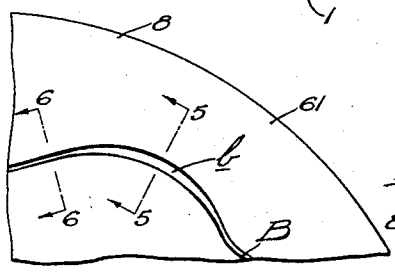


Fig. 5.



Fig. 6.



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SIGNATURE MACHINE

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Fig. 2.

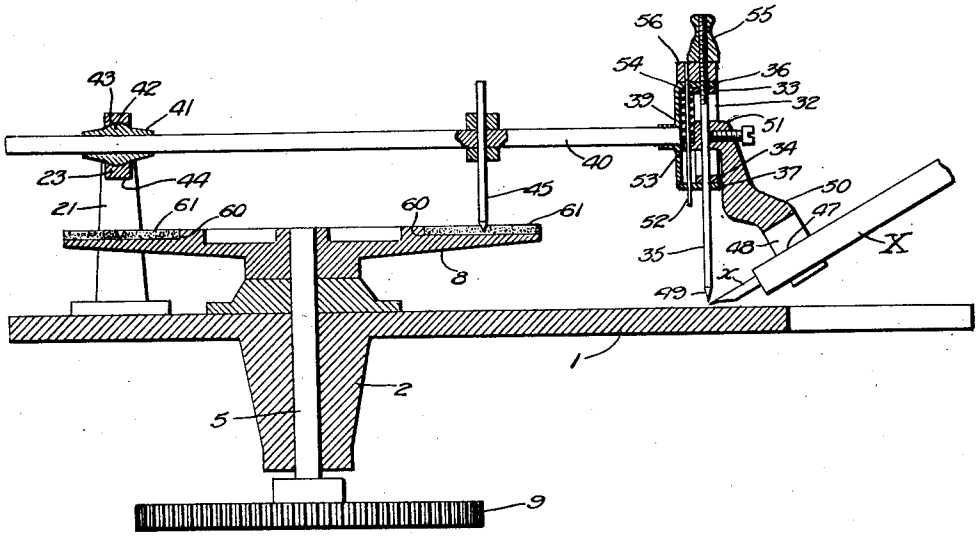


Fig. 3.

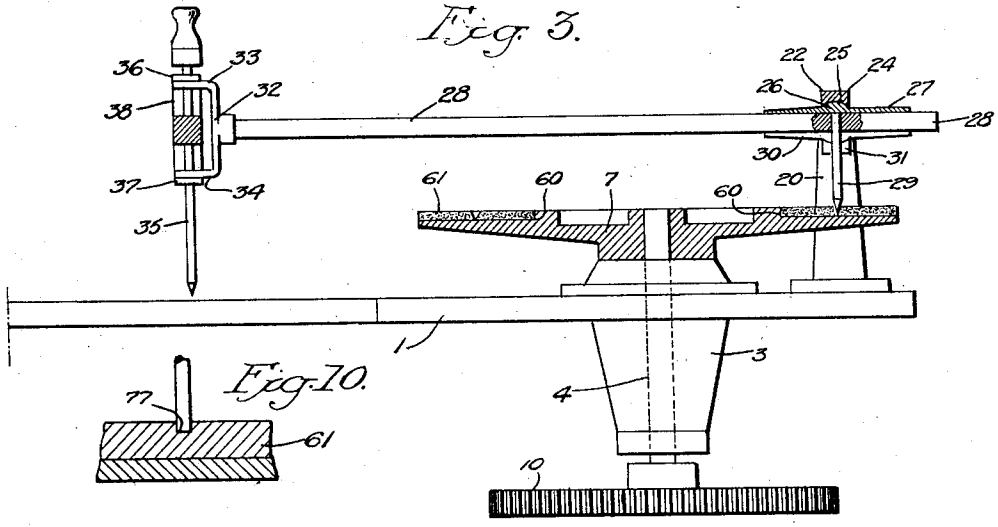


Fig. 10.

Fig. 11

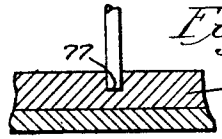
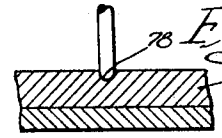


Fig. 12.



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Oct. 18, 1932. J. WHITAKER 1,883,204

SIGNATURE MACHINE

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Fig. 7.

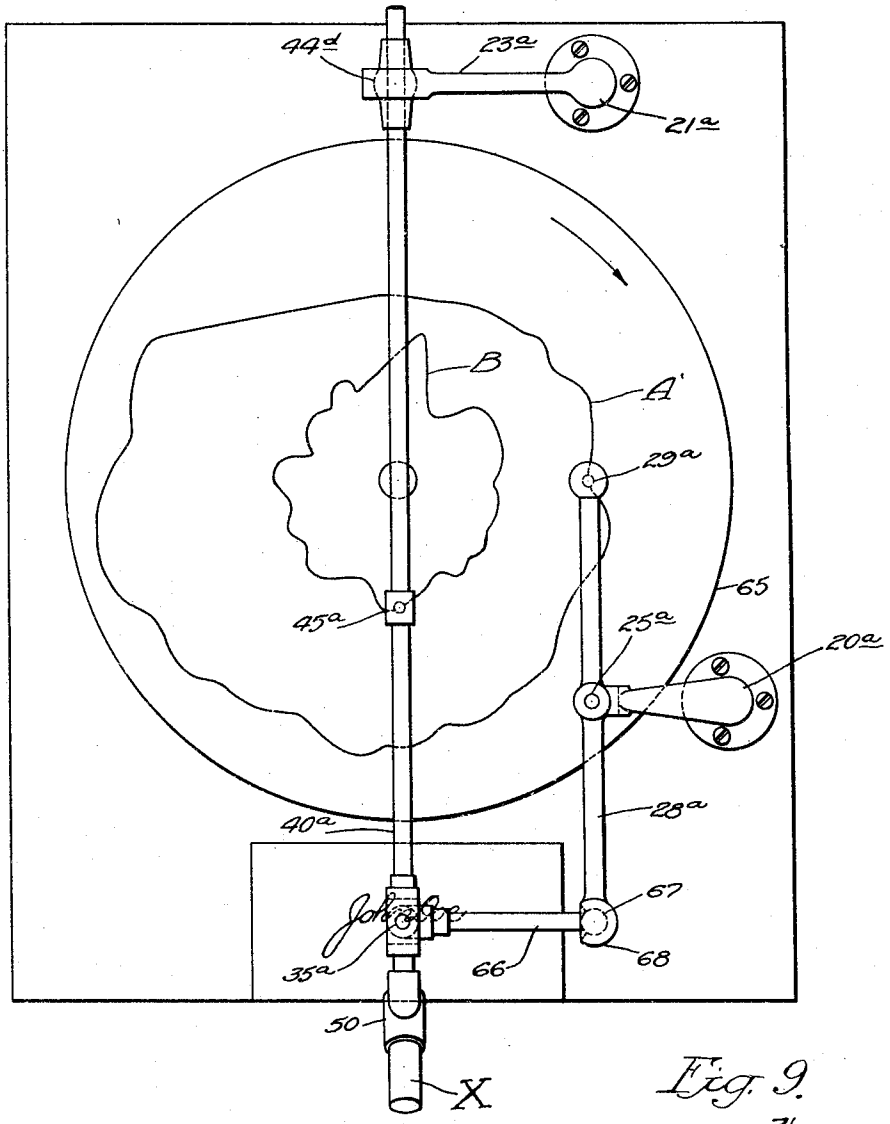


Fig. 8.

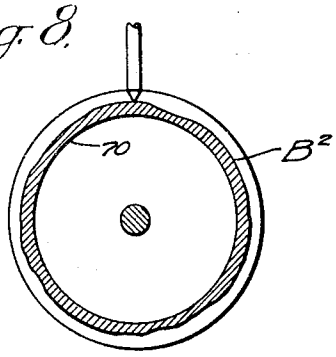
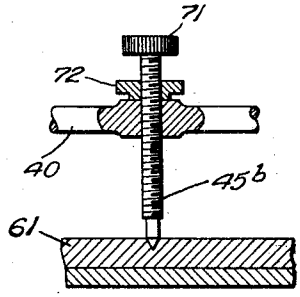


Fig. 9.



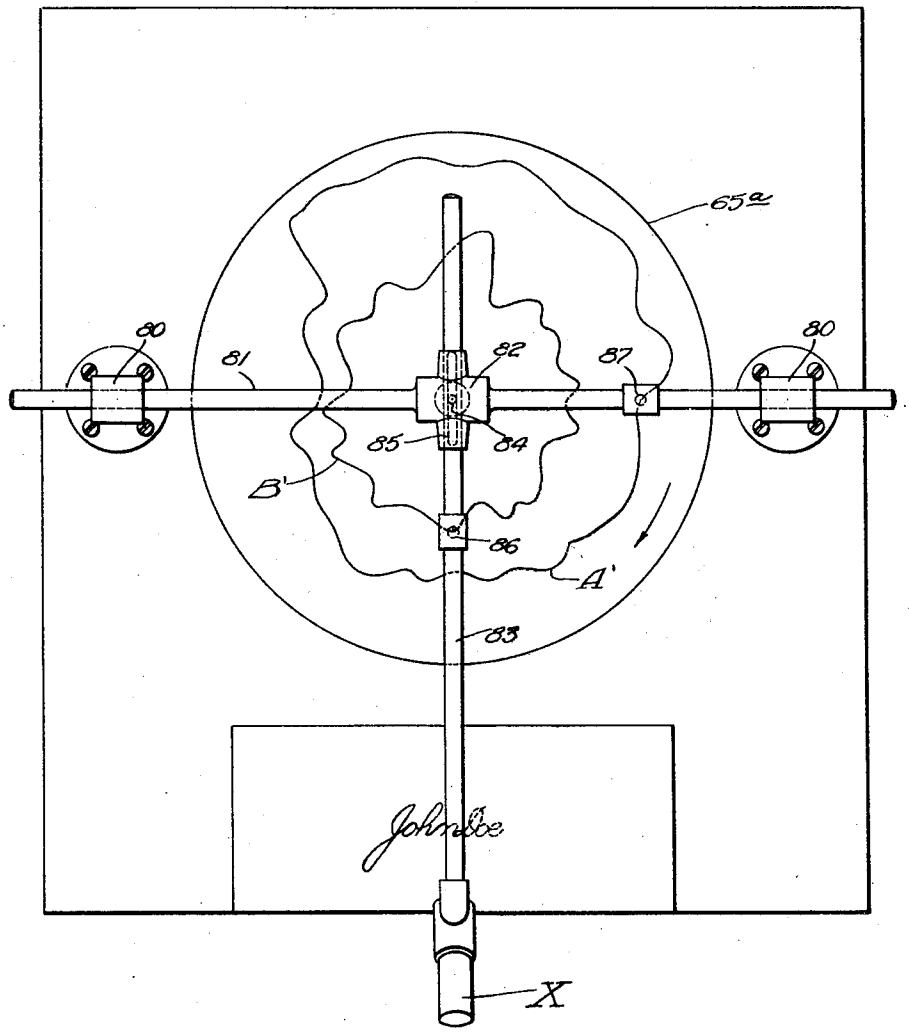
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SIGNATURE MACHINE

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Fig. 13.



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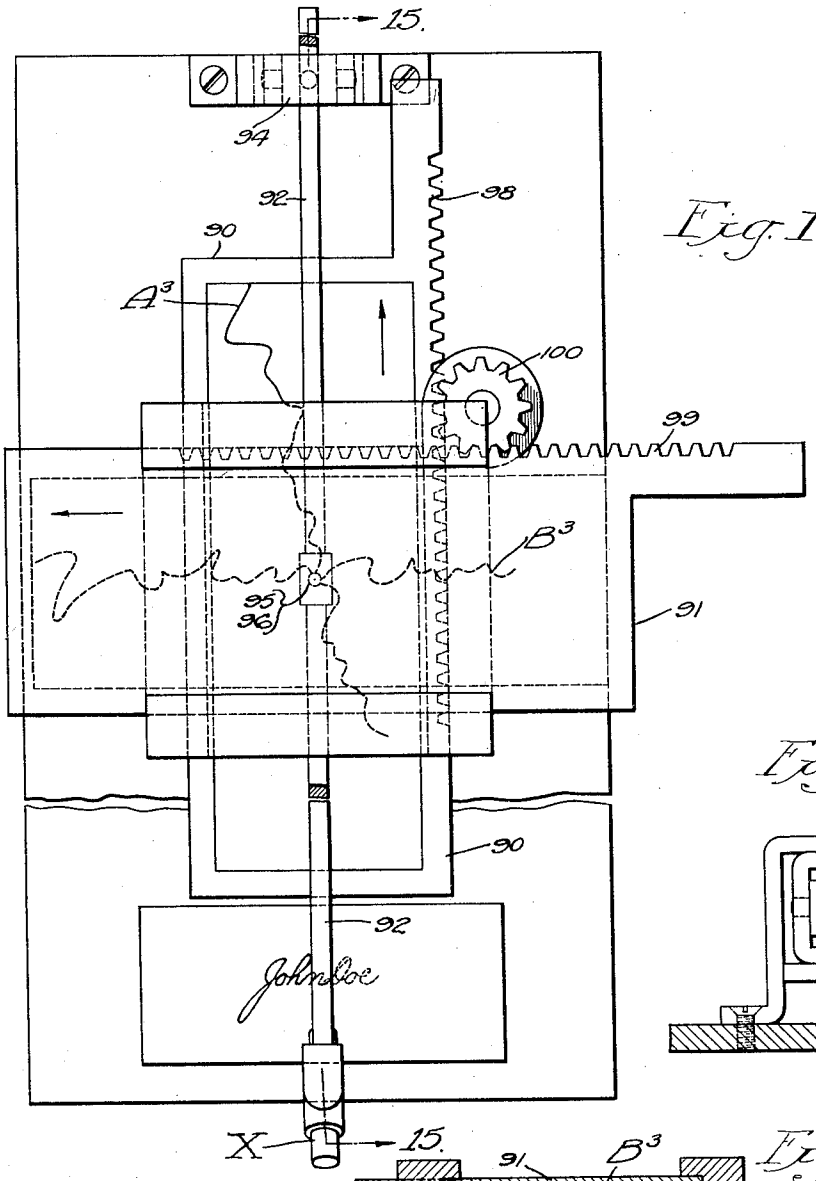


Fig. 14.

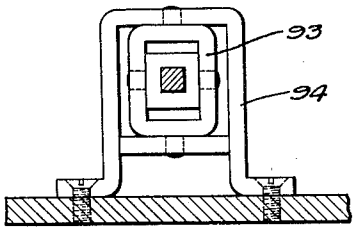


Fig. 16.

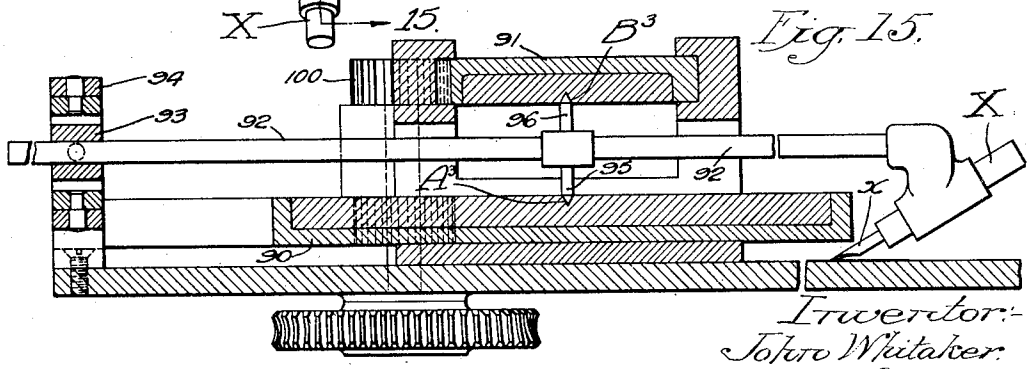


Fig. 15.

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Patented Oct. 18, 1932

1,883,204

UNITED STATES PATENT OFFICE

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SIGNATURE MACHINE

Application filed January 23, 1928. Serial No. 248,868.

This invention relates to a device for reproducing or re-creating original signatures, by writing, without variation from the original.

The original signature to be subsequently re-created is written in the usual manner by the signatory using an ordinary writing or fountain pen to which is operatively attached mechanical means adapted to inscribe upon one or more moving elements a plurality of grooves, which, when the movable element or elements are subsequently operated, will coordinately move the pen over the surface to be written upon in such a manner as to re-create the original signature without variation therefrom.

Referring to the drawings:

Fig. 1 is a plan view of the device;

Fig. 2 is a sectional elevation taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional elevation taken on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged plan view of a portion of one of the movable elements showing a groove formed therein;

Fig. 5 is a section on the line 5—5, Fig. 4;

Fig. 6 is a section on the line 6—6, Fig. 4;

Fig. 7 is a plan view of a modified form of the invention showing a pair of controlling grooves formed in a single movable element;

Fig. 8 is a cross-sectional view of a cylinder which may be substituted for either one or both of the discs, and showing an undulated groove formed in its outer surface;

Fig. 9 is a modified form of adjusting means for regulating the position of the writing implement relative to the writing surface and with respect to the controlling disc;

Figs. 10 and 11 show a tracer element having a blunt end operating respectively in the high and low portions of an undulated groove;

Fig. 12 shows a tracer element having a rounded end;

Fig. 13 is a plan view of another modified form of the invention;

Fig. 14 is a plan view of still another modified form of the invention;

Fig. 15 is a sectional elevation taken on the line 15—15, Fig. 14, and

Fig. 16 is a rear elevation of the universal mounting for the pen carrying bar illustrated in Figs. 14 and 15.

Referring to Figs. 1, 2 and 3 of the drawings, 1 indicates a base plate on which is formed a pair of vertically disposed bearings 2 and 3. In the bearings 2 and 3 are rotatably mounted vertical shafts 4 and 5 respectively. Secured to the upper ends of the shafts 4 and 5 are discs 7 and 8, respectively. On the lower ends of the shafts 4 and 5 are respectively secured gear wheels 9 and 10, which intermesh with a gear wheel 11 rotatably mounted on a vertically disposed shaft 12, secured in the base plate 1. A pinion 13 is rotatably mounted on a vertical shaft 14 and meshes with the gear wheel 11. Secured to the pinion 13 is a worm wheel 15 which meshes with a worm 16 secured to the armature shaft 17 of an electric motor 18. The motor 18 is supported by and on the under side of the base plate 1.

On the upper side of the base plate 1, adjacent the discs 7 and 8, are rigidly secured standards 20 and 21, respectively, which are provided with laterally extending arms 22 and 23 respectively.

The outer end of the arm 22 is provided with a head 24 in which is formed a spherical cavity 25, within which is mounted a ball portion 26 of a bearing 27. Slidably mounted in the bearing 27 is one end of a rod 28. Rigidly secured in the rod 28 is a depending pin 29, which is adapted to slide in a slot 30 formed in the lower side of the bearing 27. The head 24 of the arm 23 is slotted at 31 to permit movement of the pin 29 longitudinally of the bearing 27 when the rod 28 is moved longitudinally with respect to the bearing 27. The pin 29 is adapted to engage the disc 7 for purposes hereinafter set forth.

The opposite end of the rod 28 is provided with a yoke 32 having arms 33 and 34, in which is mounted a vertical pivot pin 35. The pivot pin 35 also passes through arms 36 and 37 which lie respectively above and below the arms 33 and 34 of the yoke 32 of the rod 28. The arms 36 and 37 project from

a yoke 39 formed on one end of a rod 40, the opposite end of which is slidably mounted in a bearing 41 having a ball portion 42 which is universally mounted in a spherical cavity 43 formed in a head 44 on the end of the arm 23 of the standard 21. Intermediate the yoke 39 and bearing 41, the rod 40 is provided with a depending rigidly mounted pin 45 which is adapted to engage the disc 8 for purpose hereinafter set forth.

The rods 28 and 40 being pivotally connected together by the pivot pin 35 form a jointed support 46 for a writing implement, in the present instance a pen x, and is universally hung from the standards 20 and 21 for purposes hereinafter set forth.

The lower end of the pin 35 is pointed as indicated at 49 and extends to a position adjacent the surface of the bed plate 1, and acts as an indicator for the setting of the pen x which is carried in a holder X. The holder X may be a plain pen holder or the barrel of a fountain pen, and extends through an opening 47 formed in one end of a carrier 50. A split 48 is formed in the carrier 50 and longitudinally intersects the opening 47, whereby the pen holder X is resiliently gripped and frictionally held in said carrier. This construction permits the point of the pen x to be brought into a position in axial alignment with the pivotal center 35 of the jointed support 46, the pointed end 49 of the pivot pin 35 indicating the correct position to be assumed by the point of the pen.

The opposite end of the carrier 50 is provided with a head 51 which is rigidly mounted on the pivot pin 35 intermediate the arms 33 and 34 of the yoke 32. A guide pin 52 is slidably mounted in the arms 36 and 37 of the yoke 39 in a position parallel to the indicating pivot pin 35. The carrier 50 is provided with a lug 53 through which the guide pin 52 passes. A spring 54 is mounted on the pin 52 between the lug 53 of the carrier 50 and the arm 36 of the yoke 39. The indicator pin 35 and the guide pin 52 each project above the arm 36 of the yoke 39. The upper end of the indicator pin 35 is threaded for reception of a nut or knob 55. Intermediate the knob 55 and the arm 36 is a block 56 in which the upper end of the guide pin 52 is rigidly secured. The indicator pin 35 is adapted to pass freely through the block 56. The spring 54 tends at all times to move the pen x and the indicator pin 35 downward with respect to the jointed support 46, and by turning the knob 55 on the pin 35 the pen x and the point of the indicator pin 35 may be moved toward and away from the jointed support, thus the pen x may be adjusted into proper writing engagement with the surface on which the writing of a signature is to be effected. The guide pin 52 and lug 53 on the pen holder carrier 50 prevents rotation of the carrier relative to the jointed support, and maintains the holder X and the pen x in a definite relation to and in alignment with the rod 40.

The discs 7 and 8 are each recessed as indicated at 60, and a semi-plastic material, or any desired form of material indicated at 61 which may readily be engraved by the pins 29 and 45, is placed on the discs. For example, I may use plaster of Paris mixed with water containing about 2% glue, to which is added common grease equaling about 5% of the weight of the dry plaster of Paris.

In operation a person, whose signature it is desired to reproduce, grasps the pen holder X in the ordinary manner and proceeds to write his signature on a paper Z placed on the base plate 1. The motor 18 rotates the discs 7 and 8 as the signature is being written. As the writing progresses, the pins 29 and 45 are moved over the surfaces of the rotating discs 7 and 8 respectively which engraves lines or grooves A and B on the discs 7 and 8 respectively.

As the signatory presses more or less on the pen X, in shaping the letters of his signature, the pin 45 is pressed into the material 61 on the disc 8 to a greater or less extent, consequently the groove B will, in addition to recording the vertical strokes of the pen, vary in depth relative to the surface of the disc, thus a record of the shading of the letters will also be recorded on the disc 8.

As the writing progresses from left to right the pin 29 will be moved accordingly over the surface of the disc 7, and thereby record the motions of the pen in a horizontal direction.

After the writing of the original signature has been completed the discs 7 and 8 may be passed through a hardening process to "set" the grooves A and B therein, if desired.

When it is desired to reproduce or re-create the original signature, a document to be signed is placed on the base plate 1, with the pen x at the place on the document where it is desired to start the signature, and the discs 7 and 8 in a position wherein the tracer points 29 and 45 are at the points in the grooves A and B respectively where the original signature started. The motor 18 is then started which rotates the discs 7 and 8 synchronously. As the discs are rotated, the tracer point 29, riding in the groove A on the disc 7, will cause the pen x to progressively move in a horizontal direction over the document, and synchronously and coordinately therewith the tracer point 45, riding in the groove B in the disc 8, will cause the pen x to be moved in a vertical direction, and as the tracer point 45 rides into any of the deeper portions b of the undulated groove B the overhanging weight of the elements of the jointed support 46 which is universally hung from the standards 20 and 21 will cause the pen x

to bear to a greater or lesser extent on the document and thereby shade the letters of the re-created signature in accordance with the shading of the letters of the original signature.

If desired and in cases where the person, who had written the original signature, pressed exceptionally heavy on the pen, while writing, additional weight may be added, such as an increase in the volume of the knob 55, in order to overcome the inherent resistance of the pen x to the same extent as was effected in the writing of the original signature, or a spring may be provided to hold the tracer point 45 in the bottom of the groove B at all times. Obviously the depth of the groove B governs the degree of shading of the letters, and as long as the tracer point 45 remains in the bottom of this groove the shading of the letters of the original signature will be exactly duplicated in the re-created signature, the inherent resistance of the pen x being overcome in accordance with pressure exerted on the pen when the original signature was being written.

In Fig. 7 I have shown a single rotatable disc 65 having a pair of grooves A^1 and B^1 formed therein, and in which tracer points 29a and 45a respectively are adapted to ride. The tracer point 29a is carried by a lever 28a pivoted at 25a to a standard 20a. The tracer pin 45a is carried by a rod 40a universally hung in the head 44a of an arm 23a on a standard 21a. The lever 28a and rod 40a are connected by means of a link 66, one end of which is provided with a ball 67 mounted in a spherical socket 68 formed on the end of the lever 28a. The opposite end of the link 66 is connected to the rod 40a by a pivot pin 35a in the manner as above noted with respect to the rods 40 and 28. The operation of this form of the device will be obvious, the groove A^1, through the lever 28a and link 66, effecting the horizontal motion of the pen x and the groove B^1 effecting the vertical motion of the pen x through the rod 40a as above noted, the groove B^1 also being vertically undulated to effect the shading of the letters written by the pen x.

Obviously, cylinders such as that indicated at 70 in Fig. 8 may be substituted for either of the discs 7, 8 or 65 and one of the grooves B^2, in addition to being undulated longitudinally of the cylinder 70, may also be undulated radially with respect to the center of the cylinder, for moving the pen respectively in either a vertical or horizontal direction over the paper and up and down with respect to the paper for the purpose of shading the letters being written.

When the tracer points are riding in the shallowest parts of their respective guide grooves, the pen x should be just slightly above the writing surface, to permit movement of the pen from the end of one word to the start of the next word, without making a connecting line therebetween, therefore, the pen may be readily adjusted in this respect by manipulation of the adjusting knob 55 on the pin 35. In Fig. 9 a modified form of adjusting means is shown, which is adapted to replace the adjustment at the pivot 35 of the jointed support 46. In this case the tracer point 45b on the rod 40 in place of being rigidly mounted in the said rod, as above noted with respect to the tracer point 45, is adjustably mounted therein, being threaded through a corresponding aperture formed in the rod and having a head 71 by means of which the threaded tracer point may be turned in the rod for raising and lowering the rod 40 with respect to the grooved surface of the underlying disc. A lock nut 72 is provided for obvious reasons.

The tracer points so far referred to are provided with conically pointed ends for engagement with the grooves of the operating discs, but in Figs. 10 and 11 a tracer point having a blunt end 77 is illustrated and in Fig. 12 the tracer point is shown as having a rounded end 78. In each instance, the operation of the tracer point will be the same and the grooves in the discs will be doubly or singly undulated in accordance with their respective purposes.

From the foregoing description, it will be obvious that the point of the pen x normally assumes a position in a plane slightly above the plane of the paper or other surface to be written upon, and that when the relatively movable discs, cylinders, or equivalent elements are operated the cooperative action between the undulated grooves formed in these relatively movable elements and the tracer points carried by the universally movable support for the writing implement will move the point of the pen from its normal inoperative plane into the plane of and in contact with the writing surface. Continued operation of the relatively movable elements will cause the grooves therein to coordinately move the pen over the writing surface both in a general horizontal and vertical direction to form the letters of the signature or other words being written, and the variations in the depth of at least one of the undulated grooves causes the universally mounted support of the writing implement to be moved in a direction substantially perpendicular to the plane of the writing surface for the purpose of varying the pressure applied to the pen x, for shading the letters of the words being written, thus it will be seen that at least one of the grooves in addition to having its undulations extending in a plane substantially parallel to the plane of the writing surface such undulations are further undulated in a plane substantially perpendicular to the plane of the writing surface.

Fig. 13 illustrates another modified form

of construction within the scope of my invention, and comprises a disc 65*a* having grooves A^1 and B^1 formed therein. At each side of the disc is a bearing 80, in which is rotatably and longitudinally slidably mounted a shaft 81. On the shaft 81 is formed a bearing 82 in which is longitudinally slidably mounted a rod 83, on the outer end of which is secured the pen holder X. A pin 84 extends through the bearing 82 and through a slot 85 formed in the rod 83 and prevents rotation of the rod 83 with respect to the bearing 82. On the rod 83 is a tracer point 86 which rides in the slot B for moving the pen holder X and consequently the pen carried thereby in a general vertical direction, the groove B^1 as above noted varying in depth throughout its length for shading purposes. On the shaft 81 is a tracer point 87 which rides in the groove A^1 for moving the pen in a general horizontal direction.

Obviously the sliding motion permitted of the shaft 81 and the rod 83 permits universal writing movement of the pen and the permissible rotary motion of the shaft 81 allows for the slight rise and fall of the pen for shading purposes without moving the point of the tracer 87 out of the groove B^1.

Figs. 14, 15 and 16 illustrate still another modified form of the invention in which a pair of plates 90 and 91 are superposed one above the other and mounted for movement in directions at right angles to each other. Intermediate the movable plates 90 and 91 is positioned a bar 92 having a pen holder X secured to one of its ends and having its opposite end universally and slidably mounted as indicated at 93, in a standard 94. Intermediate its ends the bar 92 is provided with a pair of oppositely disposed tracer points 95 and 96 which project into grooves A^3 and B^3 formed in the adjacent faces of the respective plates 90 and 91.

The groove A^3 extends generally in a diagonal direction relative to the plate 90, and acts to move the pen horizontally from the left to the right in writing, while the groove B^3 extends generally parallel to the edges of the plate 91 and acts to move the pin in a general vertical direction in writing, each of the grooves being undulated for the purpose of coordinately operating the pen. Each plate is provided along one of its edges with gear teeth 98 and 99 respectively and the teeth of a pinion 100 meshes with the teeth of each plate. When the pinion is rotated the plates are synchronously moved in directions at right angles to each other.

When using this form of the invention in writing the original signature, the tracer points 95 and 96 will be pressed to a greater or lesser degree into the respective plates 90 and 91 as the pressure on the pen is varied, thus when the device is operated to reproduce the signature the resultant undulations in the bases of the respective grooves will vary the pressure on the pen and effect the shading of the letters.

I claim:

1. In a writing device, the combination of a writing implement, a support for said writing implement, a tracer element carried by said support, a relatively movable element having an undulated groove adapted to receive said tracer element for moving said support in one general direction, means for moving said support in a general direction substantially at right angles to the first said general direction, said groove having additional undulations adapted to move said support substantially perpendicular to the said general directions.

2. In a writing device, the combination of a writing implement, a support for said writing implement, tracer elements carried by said support, a relatively movable element having an undulated groove adapted to receive one of said tracer elements for moving said support in one general direction, a second relatively movable element having an undulated groove adapted to receive another of said tracer elements for moving said support in a general direction substantially at right angles to the first said general direction, and at least one of said undulated grooves having additional undulations adapted to move said support in a general direction substantially perpendicular to both of the previously mentioned general directions.

3. In a writing device, the combination of a writing implement, a support for said writing implement, tracer elements carried by said support, a relatively movable element having an undulated groove adapted to receive one of said tracer elements for moving said support in one general direction, a second relatively movable element having an undulated groove adapted to receive another of said tracer elements for moving said support in a general direction substantially at right angles to the first said general direction, and at least one of said undulated grooves having additional undulations adapted to move said support in a general direction substantially perpendicular to both of the previously mentioned general directions, and means for synchronously operating said movable elements.

4. In a writing device, the combination of a writing implement, a jointed support for said writing implement, a plurality of rotatable discs having undulated grooves inscribed thereon, tracer points carried by said jointed support and adapted to ride in said grooves for moving the support and the writing implement in a predetermined path defined by said grooves, and at least one of said grooves having additional undulations for moving said support perpendicular to said predetermined path.

5. In a writing device, the combination of a writing implement, a jointed support for said writing implement, a plurality of rotatable discs having undulated grooves inscribed thereon, tracer points carried by said jointed support and adapted to ride in said grooves for moving the support and the writing implement in a predetermined path defined by said grooves, and at least one of said grooves having additional undulations for moving said support perpendicular to said predetermined path, and means for synchronously rotating said discs.

6. In a writing device, the combination of a writing implement, a jointed support for said writing implement, a plurality of rotatable discs having undulated grooves inscribed thereon, tracer points carried by said jointed support and adapted to ride in said grooves for moving the support and the writing implement in a predetermined path defined by said grooves, and at least one of said grooves having additional undulations for moving said support perpendicular to said predetermined path, means for synchonously rotating said discs, and means for adjustably securing said writing implement to said jointed support.

7. In a writing device, the combination of a base plate, a plurality of discs rotatably mounted on said base plate and having undulated grooves inscribed thereon, a writing implement, a jointed support for said writing implement comprising a plurality of rods respectively positioned adjacent said discs and pivotally joined together at a common point adjacent said writing implement, a tracer point carried by each of said rods and adapted to ride in the groove of the adjacently positioned disc for coordinately moving said writing implement in a predetermined path over said base plate as defined by the combination of the inscribed grooves on said disks, and at least one of said grooves having additional undulations for moving said support perpendicular to said predetermined path.

8. In a writing device, the combination of a base plate, a plurality of discs rotatably mounted on said base plate and having undulated grooves inscribed thereon, a writing implement, a jointed support for said writing implement comprising a plurality of rods respectively positioned adjacent said discs and pivotally joined together at a common point adjacent said writing implement, a tracer point carried by each of said rods and adapted to ride in the groove of the adjacently positioned disc for coordinately moving said writing implement in a predetermined path over said base plate as defined by the combination of the inscribed grooves on said discs, and at least one of said grooves having additional undulations for moving said support perpendicular to said predetermined path, and means for synchronously rotating said discs.

9. In a writing device, the combination of a base plate, a plurality of discs rotatably mounted on said base plate and each having an undulated groove inscribed thereon, means for synchronously rotating said discs, a writing implement, a jointed support for said writing implement comprising a rod positioned adjacent each of the respective discs said rods being pivotally joined together at a common point adjacent said writing implement, a standard adjacent each disc, a universally movable bearing carried by each standard adapted to slidably support the respective rods of the jointed support, and tracer points carried by said rods and adapted to ride in the grooves of the respective discs for moving the said writing implement in a predetermined path over said base plate, as defined by the combination of the inscribed grooves on said discs.

10. In a writing device, the combination of a base plate, a plurality of discs rotatably mounted on said base plate and each having an undulated groove inscribed thereon, means for synchronously rotating said discs, a jointed support comprising a plurality of rods universally and slidably supported on said base plate, a writing implement carried by said jointed support, tracer points carried by said rods and adapted to ride in the grooves of said discs, an indicator pin carried by said jointed support in alignment with the pivotal center of the joint thereof and extending to a point adjacent said base plate, and means for adjustably securing said writing implement on said jointed support whereby the point of said writing implement may be aligned with said indicator pin and the pivotal center of said jointed frame.

11. In a signature writing device, the combination of a base plate, a writing implement having a point positioned adjacent the surface of said base plate, a jointed support for said writing implement comprising a pair of rods pivotally connected to each other at a point above the point of said writing implement and extending substantially at right angles to each other above said base plate, means for universally and slidably supporting the ends of said rods opposite the joint formed therebetween, a disc rotatably supported on said base plate intermediate said base plate and each of said rods, a tracer point carried by each rod and adapted to engage the surface of the respective underlying disc, and means for synchronously rotating said discs whereby when the writing implement is manually moved relative to the surface of said base plate, as in writing a signature, the said tracer points will be moved relative to the surfaces of said discs in addition to the relative movement caused by the rotation of said discs, and one of said tracer points will record on the engaged surface of

one of said discs the movement of said writing implement in a substantially horizontal direction and the other of said tracer points will record on the engaged surface of the other of said discs the movements of said writing implement in a substantially vertical direction, the record on each disc being in the form of an undulated groove inscribed on the surface thereof and the groove in at least one of said discs being of varying depth relative to the surface of the disc throughout its length caused by a variation in the pressure exerted on said writing implement, whereby the shading of the written letters is recorded on said disc.

12. In a signature writing device, the combination of a base plate, a writing implement having a point positioned adjacent the surface of said base plate, a jointed support for said writing implement comprising a pair of rods pivotally connected to each other at a point above the point of said writing implement and extending substantially at right angles to each other above said base place, means for universally and slidably supporting the ends of said rods opposite the joint formed therebetween, a disc rotatably supported on said base plate intermediate said base plate and each of said rods, each of said discs having an undulated groove inscribed on its upper surface and the groove in at least one of said discs varying in depth throughout its length relative to the surface of said disc, a tracer point carried by each of said rods adapted to ride in the grooves of the respective discs, and means for synchronously rotating said discs, whereby the said tracer points will effect movement of the writing implement relative to the surface of said base plate in accordance with the combined shapes of the grooves in said discs and whereby the weight of said jointed support will effect a variation in the pressure exerted on said writing implement in accordance with the variations in the depth of at least one of said grooves.

13. In a writing device, the combination of a writing implement, a jointed support for said writing implement, a plurality of discs adapted for rotary movement and each having a relatively soft surface, means for rotating said discs, and tracer points carried by the jointed support and adapted to engage the relatively soft surfaces of said discs for inscribing grooves of various contours in said discs when the writing implement is manually moved, as in the writing of a signature, at least one of said grooves varying in depth relative to the surface of the disc in accordance with any variation effected in the pressure exerted on the writing implement during the writing operation.

14. In a writing device, the combination of a writing implement, a base structure, means for universally supporting said writing implement relative to said base structure, a disc rotatably mounted on said base structure and having an undulated groove inscribed thereon said groove varying in depth throughout its length, a tracer point cooperatively connected to said writing implement and adapted to ride in said groove, means for rotating said disc whereby said tracer point will effect a movement of said writing implement in one direction relative to said base structure, and means operatively connected to said writing implement for moving the same in a direction substantially at right angles to the direction of movement effected by said disc.

15. In a writing device, the combination of a writing implement, a base structure for said writing implement, means for universally supporting said writing implement relative to said base structure, a disc rotatably mounted on said base structure and having a groove varying in depth throughout its length, a tracer point cooperatively connected to said writing implement and adapted to ride in said groove, means for rotating said disc whereby said tracer point will effect a movement of said writing implement in one direction relative to said base structure, means operatively connected to said writing implement for moving the same in a direction substantially at right angles to the direction of movement effected by said disc, and means for maintaining said tracer point in the bottom of said groove at all times for varying the degree of pressure exerted on said writing implement in accordance with the variations in the depth of said groove.

16. In a writing device, the combination of a writing implement, a structure for supporting the article to be written upon, means for universally supporting the writing implement relative to said article supporting structure, a rotatably mounted disc having an undulated groove inscribed thereon, a tracer point operatively connected to said writing implement and adapted to ride in said groove for moving the said writing implement in one direction relative to the article being written upon, means for rotating said disc to effect said movement of the tracer point, and means for effecting relative movement between the writing implement and the article being written upon in a direction substantially at right angles to the direction of movement effected by said disc, said groove having additional undulations engaged by said tracer point for varying the pressure exerted on the writing implement in accordance with the said additional undulations.

17. In a writing device, a scriber controlling element having a stylus guideway provided with undulations effective in different planes throughout a writing portion of the groove for forming and simultaneously shading characters being written by the scriber.

18. In a writing device, a scriber control-

ling element having a stylus guideway provided with undulations effective in planes disposed at right angles to each other throughout a writing portion of the groove for forming and simultaneously shading characters being written by the scriber.

19. In a writing device, a scriber controlling element having an undulated V-shaped groove, a stylus having a correspondingly shaped end riding in said groove and movable thereby in a plane substantially parallel to the plane of the surface in which the groove is formed, the base of said groove being provided with undulations disposed substantially perpendicular to the said surface for moving the stylus in a plane substantially perpendicular to said grooved surface.

20. In a writing device, a scriber controlling element having an undulated V-shaped groove of varying depth throughout a writing portion thereof, and a stylus having a correspondingly shaped end riding in and arranged to follow the varying depth of the writing portion of the groove to form and simultaneously shade characters being written by the scriber.

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