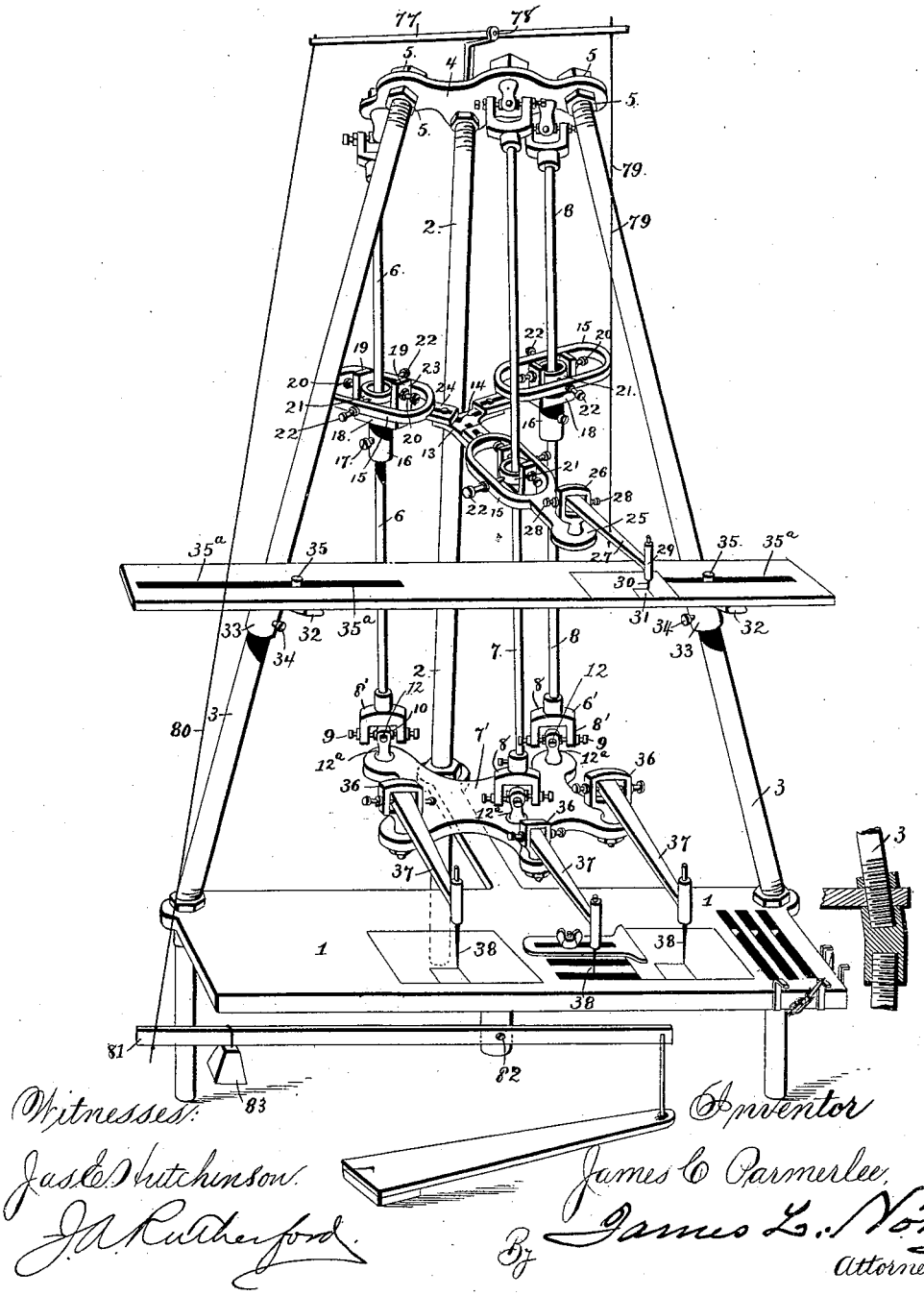
(No Model.) 6 Sheets—Sheet 1.

J. C. PARMERLEE.

ENGRAVING MACHINE.

No. 454,063. Patented June 16, 1891.

Fig. 1.



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(No Model.) 6 Sheets—Sheet 2.

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Fig. 2.

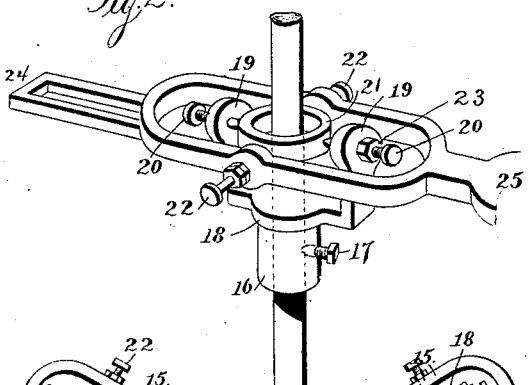

Fig. 3.

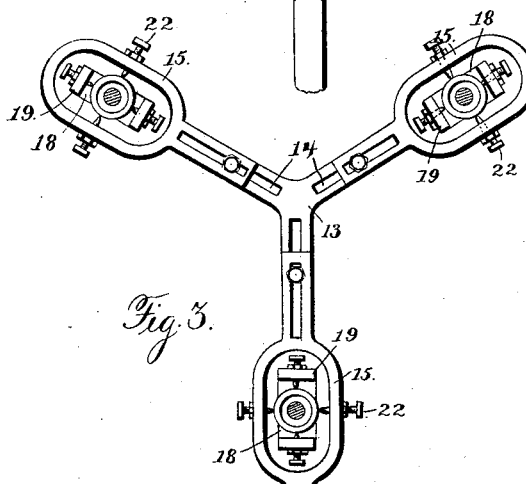

Fig. 4.

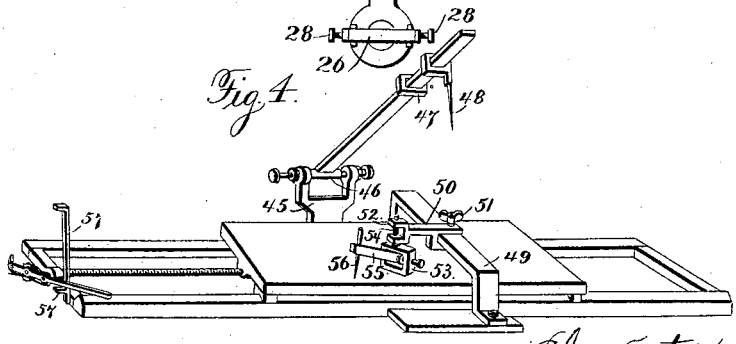

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Fig. 5.

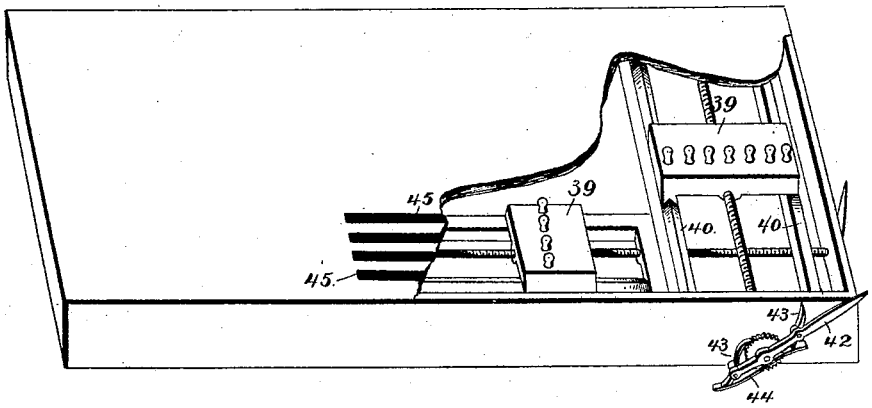

Fig. 6.

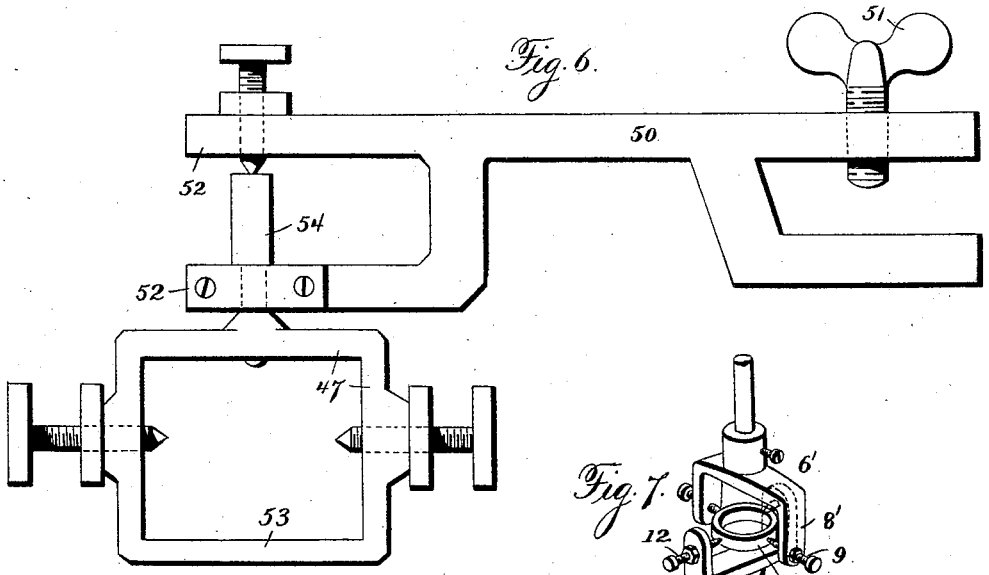

Fig. 7.

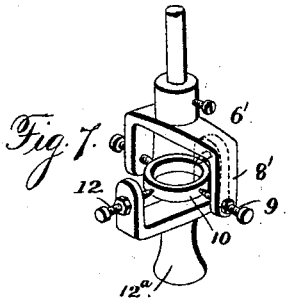

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Fig. 8.

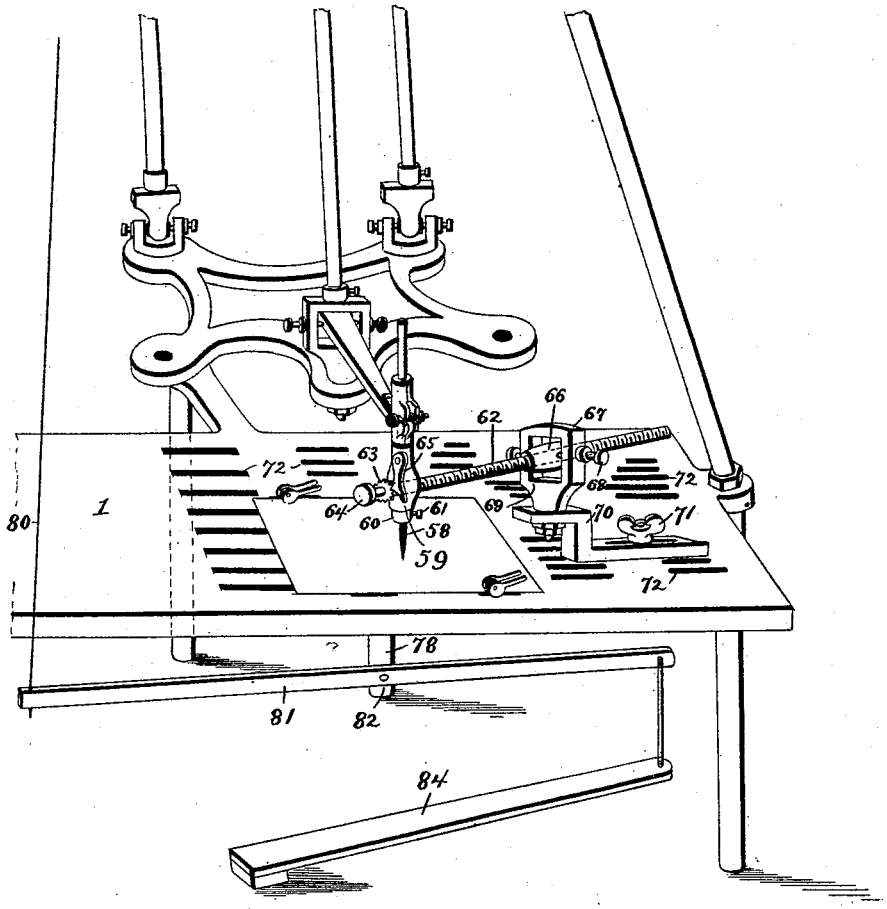

Fig. 9.

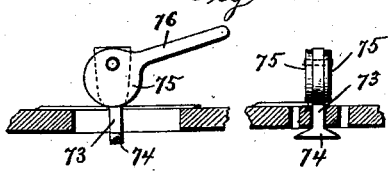

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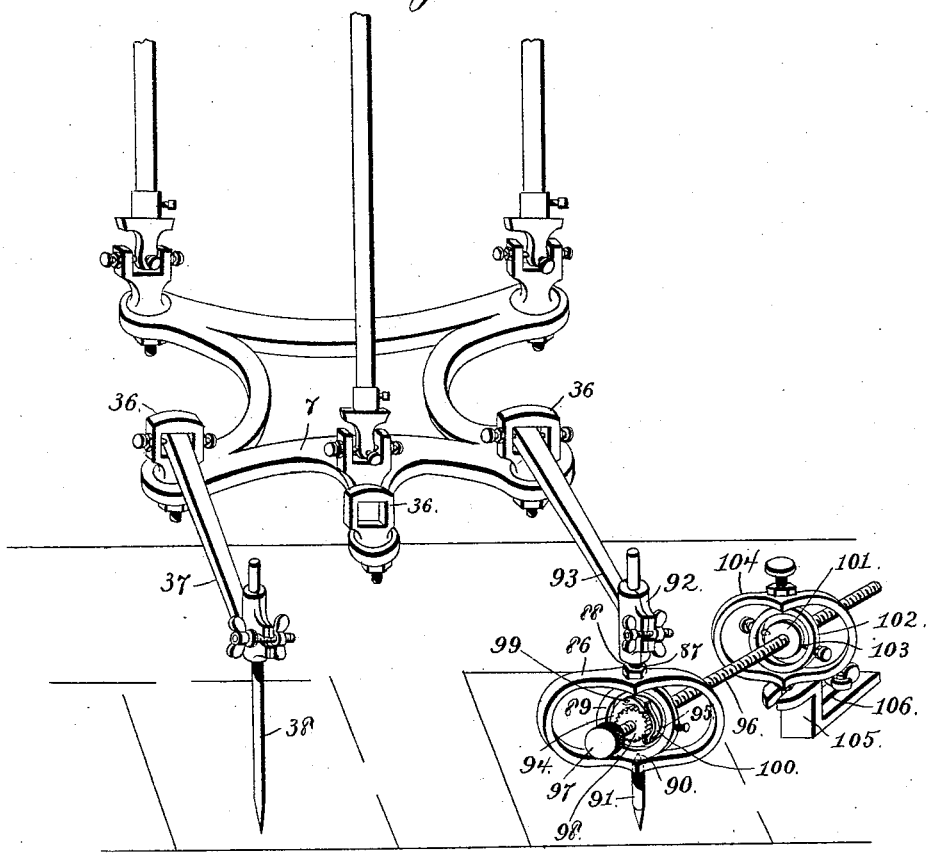
Fig. 10.



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(No Model.) 6 Sheets—Sheet 6.

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ENGRAVING MACHINE.

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Fig. 11.

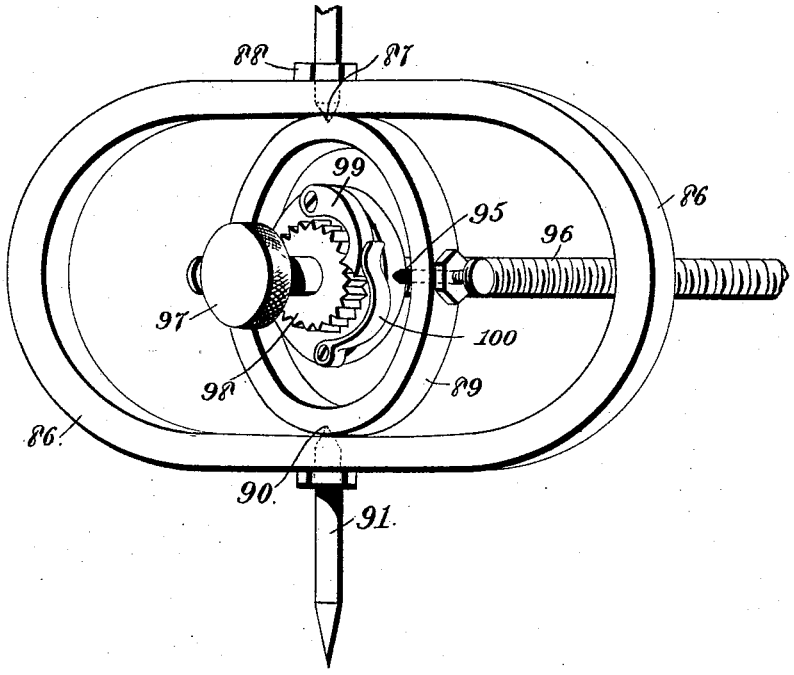
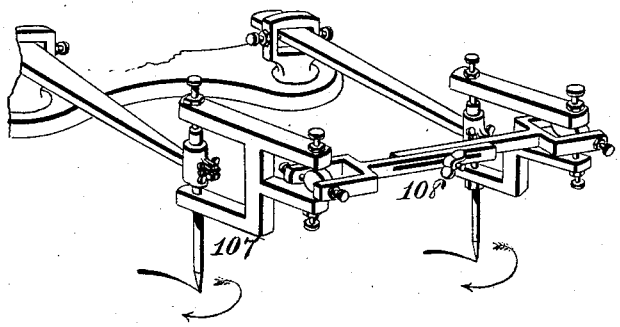


Fig. 12.



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UNITED STATES PATENT OFFICE.

JAMES C. PARMERLEE, OF SEDALIA, MISSOURI.

ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 454,063, dated June 16, 1891.

Application filed September 18, 1890. Serial No. 365,394. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. PARMERLEE, a citizen of the United States, residing at Sedalia, in the county of Pettis and State of Missouri, have invented new and useful Improvements in Engraving-Machines, of which the following is a specification.

This invention relates to the engraving-machine constituting the subject-matter of my application for Letters Patent filed September 11, 1889, Serial No. 323,590, wherein a plate or support is adapted to move horizontally in all directions above a work-table and carries vertically-swinging arms, to which are secured the stylus or graver and the tracer, whereby the tracer follows the lines of the picture to be reproduced by the stylus or graver on a steel or other plate coated with wax-like or chalky material to form a matrix from which to make a cast for producing a stereotype-plate of the drawing made on the coated steel or other plate.

The objects of my present invention are to improve the prior machine; to provide means whereby it is possible to produce varying sizes of reproductions or copies; to provide novel means for reducing or enlarging and working details uniformly and to a gage; to provide means for drawing parallel lines, either rectilinear, curved, waved, or of any form desired, and to combine with the engraving mechanism means whereby a picture may be engraved in duplicate or in triplicate independently or at one and the same operation.

My invention consists to these ends in the several novel features of construction and new combinations of parts hereinafter fully set forth, and then definitely pointed out in the claims following this specification.

To enable others skilled in the art to practice the said invention, I will now describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of the entire mechanism, with exceptions as hereinafter stated. Fig. 2 is a detail perspective of one of the adjustable couplings for the reducing attachment. Fig. 3 is a plan view of the series of couplings and yokes connected together. Fig. 4 is a perspective view of the ruling and lining devices. Fig. 5 is a similar view of the mechanism whereby the ruling and lining guides of various form are adjusted to a gage. Fig. 6 is a detail elevation of the devices carrying the stylus in Fig. 4, used for tracing curved lines to an exact gage. Fig. 7 is a detail view of one of the universal joints connecting the swinging rods to their points of suspension and to the swinging plate. Fig. 8 is a perspective showing a modified construction. Fig. 9 is a view, partly in longitudinal and partly in transverse vertical section, showing the manner of applying and fastening the clips holding the work in place. Fig. 10 is a detail perspective view showing a modified construction of the curve-drawing attachment. Fig. 11 is a detail perspective, upon an enlarged scale, showing a portion of the curve-drawing mechanism. Fig. 12 is a perspective view showing a construction and arrangement of parts whereby the lines may be graduated as to thickness or weight, the graduation running from a thin to a heavy line and varying by rapid or imperceptible graduations at the will of the operator.

In the said drawings, the reference-numeral 1 denotes the base or work-table upon which the mechanism is supported. This base, which may be made of metal or other suitable material, is provided with a central arm 2, arranged at a right angle with the edge of the plate. From the ends of the plate 1, upon that side of the plate which is adjacent to the arm 2, I mount two rigid standards 3, their threaded ends passing through the plate and receiving nuts, which are turned up against both sides of said plate. These standards converge toward the top, where they penetrate a plate 4, in the openings of which they are fastened by nuts 5.

Suspended from the plate 4 are rods 6, 7, and 8, their ends being connected to the plate by a universal joint 6′, which will be more particularly described hereinafter. At their lower ends, which lie a short distance above the base-plate 1, these rods are connected to a plate 7′ by means of a forked bracket 8′, clamped upon the rod and having pivot-pins 9 passing through the arms of the fork, their points resting in seats formed in a ring or center-block 10, which is pivoted between the points of screws 12, tapped through the opposite members of the forked head 12ª, mounted

on the plate 7. Intermediate of the extremities of the several rods is arranged a coupling 13, having longitudinal slots 14 in its arms, which unite at a common center and radiate at equal angles from said point. Upon this coupling I mount the loops or yokes 15, each having the following construction and attachment: Upon each rod is placed a movable sleeve 16, Fig. 2, clamped thereto at any point by a set-bolt 17. Upon this sleeve is formed a collar or flange 18, from diametrically-opposite points of which rise lugs 19, through which are tapped screws 20, having their pivotal points arranged to seat against the opposite faces of a ring 21, which is disconnected from but surrounds the rod. Through the parallel sides of the yoke are tapped two similar screws 22, having a like engagement with the ring 21 at points quartering with the screws 20, or, in other words, separated from the latter by ninety degrees of arc. All of these screws are held by jam-nuts 23. Upon each of the yokes 15 is a slotted arm 24, by which it is mounted upon the coupling 13 and rendered adjustable thereon. Upon one or more of the yokes is formed or mounted an extension 25, provided with an upright stud upon its end, which carries a loop 26, within which is inserted the end of an arm 27. Screws 28 are tapped through the opposite vertical arms of the loop 26 and have their points engaging with the opposite faces or edges of the arm 27, whereby a pivotal or rising-and-falling movement of the end of the arm is permitted. Upon the end is mounted a head 29, within which is arranged a stylus 30, having its point arranged to move over a table 31. This table is sustained by bracket-arms 32, projecting from sleeves 33, which are vertically adjustable upon the standards of the machine, being held at any point of adjustment by set-screws 34. From each bracket-arm 32 rises a lug 35, adapted to lie within a slot 35^a in the table 31 and suitably fastened. Upon the plate 7 are mounted loops 36, similar to the loop 26, already described, and within these loops are pivoted similar arms 37, each carrying a stylus 38. It will readily be seen that while one of these is the working-arm the other is the pattern or stencil arm, which is operated by the engraver, the stylus being caused to follow accurately each line of the picture to be produced, whereby said lines will be reproduced by the other stylus and upon the same scale. The stylus 30 upon the arm 27 will also reproduce the same lines; but, inasmuch as it is at a point nearer the fixed bearings for the upper ends of the rods 6 7 8, the lines reproduced will be reduced in proportion to the relative distance between the central coupling and the fixed bearings at the top of the frame and the distance between said fixed upper bearings and the point at which the lower ends of the rods are attached to the swinging plate. By the adjustment of the coupling and by a corresponding adjustment of the table 31 reproductions of half, quarter, or any other size required may be accurately formed.

Upon the base-plate 1, I may arrange means for drawing parallel lines, either straight or curved. These devices consist of a carriage 39, Fig. 5, which has rectilinear movement upon a track 40, the latter having one smooth rail, the other being provided with an edge shaped like an inverted **V**. A single leg of the carriage runs upon the flat rail, while two notched or slotted legs—one at each end of the carriage—engage the guide-rail; or, on the other hand, a single track may be used either grooved or dovetailed, or the carriage may travel upon one or more rods, and the carriage may be held in place by means of springs or weights. The carriage is operated by a screw, although I may substitute a rack and pinion or a cord and pulley therefor. When the screw or pinion is used, they are operated by the double pawl shown, consisting of a pawl-lever 42, loosely mounted on the shaft of the screw or pinion and carrying two independent pawls 43 on diametrically-opposite sides of the ratchet-wheel or pinion driving the shaft. A spring 44, bolted to the lever between the pawls, gives the elastic throw necessary to engage the nose of the pawl with the wheel or pinion on the shaft and at the same time holds either pawl back out of engagement with the wheel. Suitable stops may be provided, as hereinafter described, to regulate the throw of the ratchet and provide uniform work.

Openings 45 are formed in the table 1 in line with studs 45^a upon the carriage to provide means of access to the latter and to the studs thereon, which project up through and to or nearly to the top of the table, whereby a thumb-screw may be inserted in any one of said studs for the purpose of securing the guides for ruling, curving, &c. These guides are fastened to the studs at one or more points, as required.

It will be noted that parallel lines drawn at distances apart, which are regulated by the screw, operated by the pawl-and-ratchet wheel, as set forth, may be drawn in any direction by simply turning and fastening the guides. The latter may be constructed with straight or curved sides or of any combination of straight or curved lines desired embodied in one or in several guides. The latter are formed of thin material in order that the point of the stylus shall follow the edge closely.

For ruling parallel lines and forming concentric curves I may employ the devices shown in Fig. 4, in which I feed the table by means similar to those already set forth—that is to say, by a screw-shaft revolved by a pawl and ratchet. Upon one side of the table is a forked bearing 45, having a bar 46 pivoted between the arms of the fork and lying transversely to the adjustable table. Upon this arm are mounted harness-loops 47, which are

adjustable or movable on the bar 46. One part of this harness carries a stylus 48, which may be drawn transversely across the table to produce parallel ruling. Should I, however, desire to form a series of similar and parallel curves or other similar lines, I may use a bridge-piece 49, extending across the table and having a transversely adjustable and movable attachment 50, which is provided with a looped or bifurcated end sliding upon but fastened to said bridge by the set-screw 51. Upon said attachment, which extends transversely to the bridge-piece 49, is a bifurcated end 52, in which is arranged a loop 53, having a shank 54 lying and pivotally mounted in the arms of the fork, and pivoted within the loop is an arm 55, capable of swinging horizontally on the axis of the shank 54 and of rising and falling upon its pivotal bearings in the yoke. By this construction a double pivotal movement is obtained, enabling the stylus 56 to be lifted and lowered and giving, by sweeping it around upon its vertical axis, curved lines of any required length. As the bridge-piece is rigidly mounted upon side extensions of the track, the table is advanced beneath it by the action of the screw and pawl-and-ratchet feed. By causing the lever operating the pawls to vibrate between stops 57 the intervals between the lines will be rendered exactly equal and the beauty and finish of the work materially enhanced. The exact construction of the curve-producing devices is shown in Fig. 6 with the working-arm omitted. By substituting for the working-arm 55 arms of different length I may easily obtain curves of any radius required, the substitution being readily and instantaneously effected by simply loosening one of the screws on which the arm is pivoted and withdrawing the one arm and replacing it with another of different length.

It will be understood that the enlargement of a picture is always more difficult than its reproduction upon the same or a smaller scale, owing to the fact that the increase in size renders the slight defects more perceptible. If sufficient care is exercised, however, a copy may be enlarged with as good results as in the other cases.

I have shown in Fig. 8 means for producing curved lines to an exact gage, which may be used in various stages of executing engravings and drawings. In this modification the stylus 58 is engaged in a socket 59, which is kept from slipping by a collar 60, in which is tapped a set-screw 61. Lying in a socket or bearing which forms part of the head containing the socket 59 is a threaded shaft 62, having on its end a ratchet 63 and thumb-nut 64, the ratchet being held by a spring-pawl 65, so formed that it will arrest and hold the ratchet when turned in either direction. The threaded shaft is in mesh with a sleeve 66, which lies within a loop 67, and is journaled on the points of set-screws 68, which are tapped through the opposite arms of a yoke 69, swiveled upon the raised horizontal arm of a bracket 70, adapted to be adjustably connected to the work-table by means of an attaching-bolt having a thumb-nut 71, the lower end of the bolt having a cross-head, which is inserted through any one of a series of slots 72 in the table and then turned transversely to the slot in the manner shown in Fig. 9, which illustrates the substantially similar method of attaching the devices holding the work. It will be seen that as the screw-shaft is turned in either direction an exact gage will be obtained for each succeeding stroke of the stylus.

I have shown in Fig. 9 the devices for holding the work upon the table, the same consisting of a shank 73, having a cross-head 74, which will readily pass through any one of the slots in the table and may be turned transversely thereto, as shown in said figures. Upon the upper projecting end of said shank I mount two cams 75, lying on opposite sides of said shank, and each having a lever 76, by which the cam may be turned down to bind the work upon the table.

I employ three or even more than three stylus-arms mounted upon the swinging frame, and when this arrangement is adopted the arm in the center should be used as a tracing-arm whenever the reducing attachment is used. When, however, it is simply desired to copy work of the same size as the pattern, then the two stylus-arms at the corners of the swinging frame should be used, and the arm in the center of the swinging plate should be removed.

When it is desired to copy work in the same size as the pattern, then the two stylus-arms at the corners of the swinging frame should be used and the central arm should be either removed or swung upward or backward out of the way. This may be effected by a lever 77, journaled on a bracket 78 on the top plate 4, said lever being connected at one end with the reproducing-arm 27 by a cord, wire, or other device 79, the other end of said lever being connected by a cord or wire 80 to a lever 81, fulcrumed on a stud 82, depending from the work-table and having a counterbalancing-weight 83, which is normally sufficient to hold the arm 27 off the work. A treadle 84 is attached to the power end of the lever, whereby the operator may at any moment by a pressure on the foot-lever throw the arm 27 into operative position. When it is desired to engage the point in the work, a pressure upon the treadle will allow the stylus-point to descend and come in contact with the plate. The same arrangement may be adopted with the other stylus-arms for a like purpose.

In tracing from outline to outline the stylus will pivot in the socket and the loop holding the pivot-nut swings on its axis, which is engaged in the bracket by pointed set-screws.

As a modification of the circle-drawing at-

tachment shown in Fig. 8, I may substitute the construction shown in Figs. 10 and 11. In these figures the reference-numeral 86 denotes the yoke, which is an oblong or orate metallic frame, through the upper member of which passes a pivot-pin 87, locked in place by a jam-nut 88, and having its point lying in a conical seat in the upper part of a vertical frame 89, which is of substantially circular form, supported at a point diametrically opposite the pin 87 by a point 90. In the same line with these pivotal points is a stylus or tracer 91. The pivot-pin 87 passes up through the clamping-bracket 92, which forms part of the tracing-arm 93. Within the circular frame 89 is arranged a disk 94, pivoted upon pins 95, which pass through said circular frame, their points engaging conical seats in the edge of said disk at points separated from the seats of the pivot-pins 87 and 90 by ninety degrees of arc. Tapped through the center of this disk is a screw-shaft 96, having upon its projecting extremity a milled screw-knob 97, rigid upon said shaft. Rigidly mounted upon this screw-shaft is a ratchet 98, which engages a pawl 99, having a tooth of such form that it engages the ratchet in both directions of rotation, said ratchet being held in operative contact with the teeth of the ratchet by a spring 100. The threaded shaft 96 is also tapped through a disk 101, substantially similar to the disk 100, and mounted within a like circular frame 102, having like pivotal pins 103, and a like yoke 104, having a vertical pivotal axis. This yoke 104, however, is sustained upon a movable or adjustable frame or bracket 105, which may be provided with a slot 106 to render it adjustable in all directions.

In Fig. 12 I have shown an attachment for turning the stylus-point, whereby lines of varied width or thickness may be produced. The points of the stylus being made flat or chisel-shaped and moved with the edge in the line of movement, they will produce fine lines; but when turned more or less the weight of the line will be varied. This attachment consists of a frame 107, rigidly connected to each stylus, said frames being connected to each other by an adjustable frame 108, whereby each may be set at a different angle from the other. Pointed gravers with an engraving-point may thus be employed for cutting metal, wood, or other substances, since by the use of the diversifying-frame 108 the point of the tool can be kept in line with the draft of the work, and thus produce a clear cut. The gravers must of course be of proper shape and in suitable condition to accomplish the purposes sought.

What I claim is—

1. In an engraving-machine, the combination, with a stationary base-plate or work-table, of a plate suspended above the same and adapted to swing in a horizontal plane in all directions, said plate being provided with arms having each a stylus, a coupling adjustable upon the supports of the swinging plate and provided with an arm carrying a stylus, and a table vertically adjustable to correspond with the adjustment of the coupling, substantially as described.

2. In an engraving-machine, the combination, with a base-plate having standards mounted thereon and united at the top by a plate, of rods or bars depending from and having universal joints connecting them with the top plate, a plate jointed to the lower ends of said rods to swing horizontally over the base-plate and provided with two pivotally-mounted arms carrying each a stylus, a vertically-adjustable coupling having loops connected to the depending rods by universal joints, and a work-table mounted on bracket-arms adjustable on the standards, said coupling having a pivoted arm carrying a stylus over the work-table, substantially as described.

3. In an engraving-machine, the combination, with a plate or table having one or more slots in its surface, of a carriage arranged beneath said plate and adapted to be moved in right lines by suitable means, said carriage having studs which project up in the slots in the table to receive interchangeable patterns, substantially as described.

4. In an engraving-machine, the combination, with a table having slots cut at right angles one with another, of carriages arranged beneath the table, each carriage being provided with studs lying in the grooves and adapted to receive screws fastening interchangeable guides, and means for operating the carriages to advance them or either of them by an intermittent gaged movement, substantially as described.

5. In an engraving-machine, the combination, with parallel rails, of a horizontal work-table supported thereby, means for giving an equal intermittent movement to the said table, an arm pivotally mounted upon one side of said table and extending transversely across the same, and a slide on said arm carrying a stylus, substantially as described.

6. In an engraving-machine, the combination, with a table and with means for advancing the same by an equal intermittent movement, of a bridge-arm mounted on rigid supports and crossing the table, a slide having one forked end embracing the bridge-arm, a loop having a vertical axis which is pivotally mounted in the other end of the slide, and an arm pivoted in the loop and having a stylus, substantially as described.

7. In an engraving-machine, the combination, with a movable work-table, of a screw-threaded shaft by which the table is advanced, said shaft having a ratchet rigidly mounted on its end and a lever loosely mounted next to the ratchet and provided with two pawls, each having a heel adapted to bear upon the end of a centrally-attached spring, whereby the pawls are held in or out of engagement with the ratchet, substantially as described.

8. In an engraving-machine, the combination, with a working-table having a series of slots formed therein, of one or more clamps composed of shanks having cross-heads adapted to enter said slots and be turned transversely thereto to be fastened therein, and cam-levers pivoted on opposite faces of said shank and adapted to be turned down to bind the plate upon the table, substantially as described.

9. In an engraving-machine, the combination, with a work-table having one or more slots, of a Z-shaped bracket resting thereon and locked in place by a bolt having a cross-head engaging the table, and a thumb-nut turned down upon a slotted end of the bracket, a loop swiveled upon the raised end thereof, a sleeve pivoted between set-screws tapped through the opposite sides of the loop, a screw-shaft meshing with a female thread in the sleeve and having a thumb-nut by which it may be revolved, a pawl holding said screw after each adjustment, and a stylus moved by the screw, substantially as described.

10. In an engraving-machine, the combination, with a work-table having one or more slots, of a Z-shaped bracket resting thereon and locked in place by a bolt having a cross-head engaging the table and a thumb-nut turned down upon a slotted end of the bracket, a loop swiveled upon the raised end thereof, a sleeve pivoted between set-screws tapped through the opposite sides of the loop, a screw-shaft meshing with a female thread in the sleeve and having a thumb-nut by which it may be revolved, a pawl holding said screw after each adjustment, a stylus moved by said screw, and a reproducing or duplicating frame connected with and moved by said stylus, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

JAMES C. PARMERLEE.

Witnesses:
E. J. SMITH,
C. E. BENTON.