No. 648,170. Patented Apr. 24, 1900.

G. M. KING.

ELLIPSOGRAPH.

(Application filed Nov. 18, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

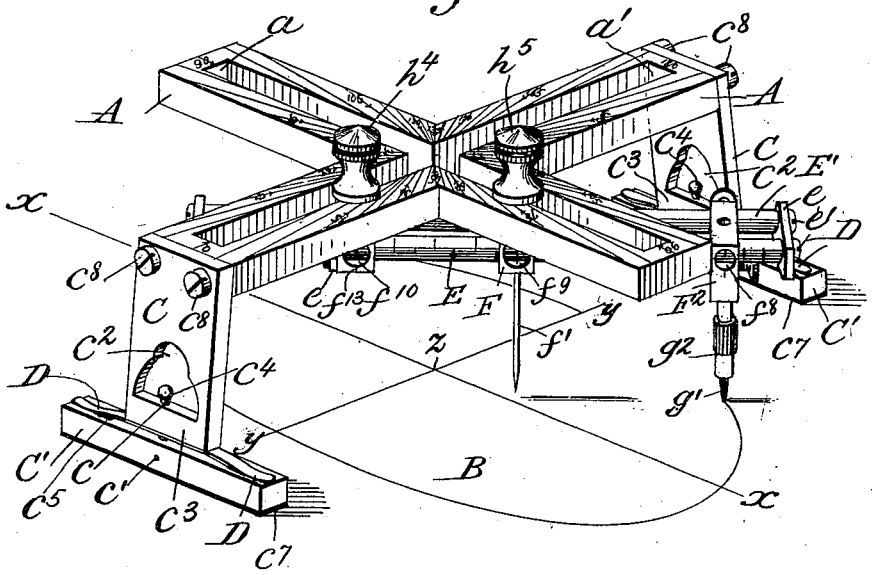


Fig. 2.

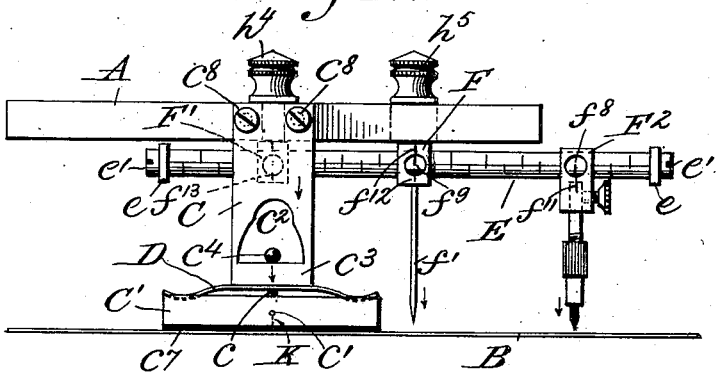


Fig. 3.

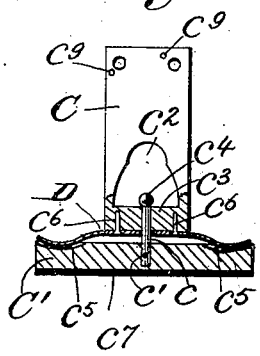
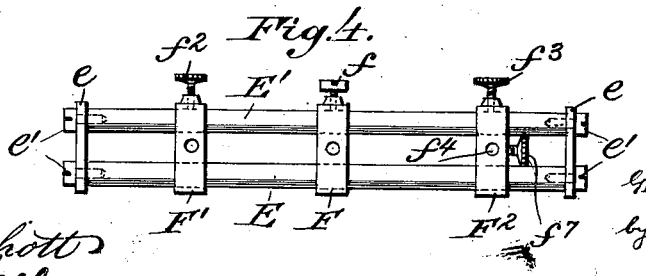


Fig. 4.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

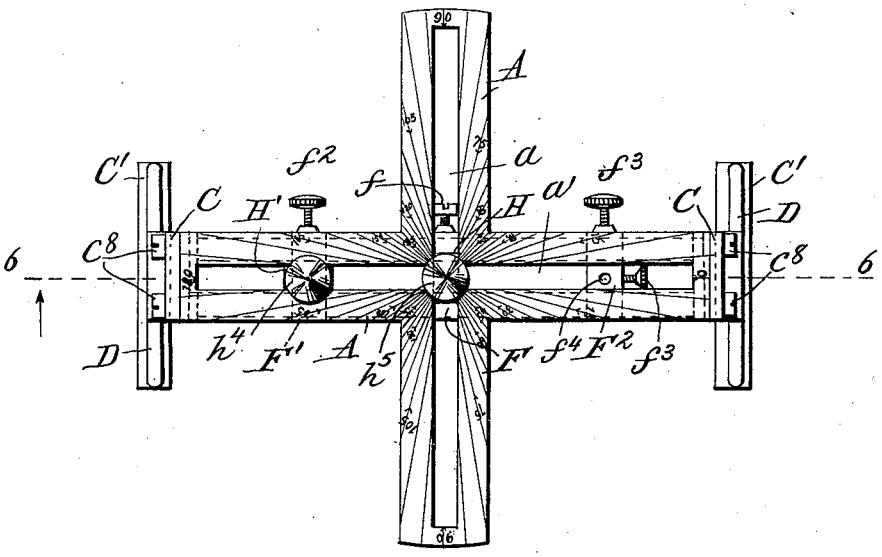


Fig. 6.

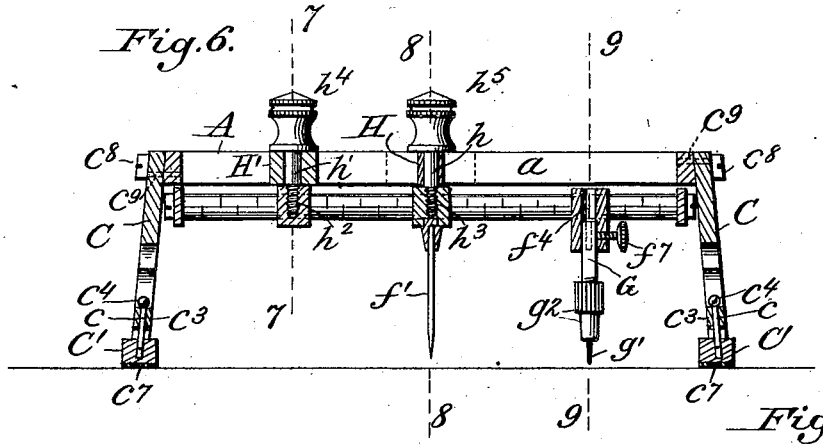


Fig. 7.

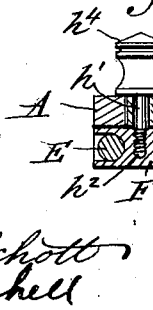


Fig. 8.

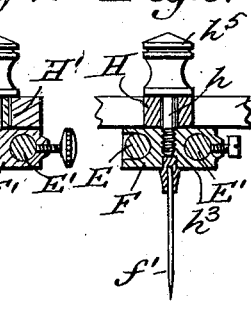


Fig. 9.

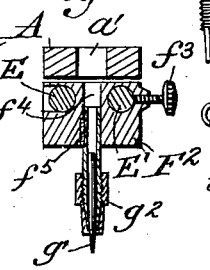
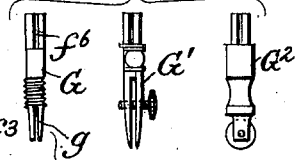


Fig. 10.



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UNITED STATES PATENT OFFICE.

GERTRUDE MITCHELL KING, OF NANTUCKET, MASSACHUSETTS.

ELLIPSOGRAPH.

SPECIFICATION forming part of Letters Patent No. 648,170, dated April 24, 1900.

Application filed November 18, 1899. Serial No. 737,495. (No model.)

To all whom it may concern:

Be it known that I, GERTRUDE MITCHELL KING, a citizen of the United States, residing at Nantucket, in the State of Massachusetts, have invented certain new and useful Improvements in Ellipsographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in ellipsographs and similar trammel instruments.

The main object of my invention is to provide a simple means for varying the pressure upon the scribing or marking point, pencil, or cutter.

With this and some other objects in view, which will be obvious to those skilled in the art, my invention consists generally in an instrument-table supported resiliently from the drafting or similar surface and carrying the marking-point, pencil, cutter, or like device.

My invention consists, further, in the features, details of construction, and combinations of parts, which will first be described in connection with the accompanying drawings and then particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of an ellipsograph embodying my invention; Fig. 2, an end view of the same; Fig. 3, a detail view of one of the supporting devices, a part being in section; Fig. 4, a plan view of the scribing-beam; Fig. 5, a plan view of the instrument; Fig. 6, a longitudinal section on the line 6 6, Fig. 5; Figs. 7, 8, and 9, transverse sections on the lines 7 7, 8 8, and 9 9, respectively, of Fig. 6; Fig. 10, detail views of the instrument-points, showing a pencil-holder, a pen, and a cutter, respectively.

Referring to the drawings, A is what I will term the "instrument-table," in the present instance formed in the general shape of a cross and preferably resembling a Maltese cross, the arms of which are provided with slots a a', intersecting each other, as shown in Figs. 1 and 5. The instrument-table is held above the surface B, on which the work is to be done, by resilient supporting mechanism, which in the present case comprises two resilient devices at opposite ends of one arm of the cross-shaped table A. Each of said resilient devices consists of a standard C and a base-piece C′, the two being united by a suitable resilient connection. The resilient connection shown in the drawings, and which is my preferred construction, consists of a guide-pin c inserted into a hole in the base-piece C′, where it is held securely by a transverse key or fastening-pin c' passing through the base-piece and through the guide-pin c.

The lower end of the respective standard C is provided with an opening, as indicated at c^2, Figs. 1, 2, and 3, whereby a transverse bar is formed at the bottom of the standard, as shown at c^3, Figs. 1 and 3, this transverse bar having a pin-hole through which the guide-pin c is inserted, the said transverse bar c^3 being free to move up and down on the pin c. In order to limit the upward movement of the said transverse bar c^3 on the pin c, the latter is provided with a suitable stop device—as, for example, the head c^4—preferably made integral with the pin c.

To the bottom of each standard C, or, in other words, to the lower face of its transverse bar, is secured a spring, in this case a bow-shaped leaf-spring D, which has its ends engaging the upper surface of the base-piece C′, said ends preferably entering recesses formed longitudinally in the respective ends of the upper surface of the base-piece C′. These recesses are shown best at c^5, Fig. 3. The springs D are secured to the bottoms of their respective standards C in any suitable way—as, for example, by the pins c^6, Fig. 3, which may be soldered or brazed into the respective holes in the bottom of the corresponding standard C, then inserted through holes in the spring D, and finally riveted on the ends, so as to form heads, which prevent the withdrawal of the respective springs.

By the above-described construction the base-pieces C′ may rest upon the drawing or other working surface B and the instrument-table A will normally be held at a certain distance above said working surface B. Upon the application of any downward pressure to the instrument-table A the springs D will be compressed, thus allowing the standards C to slide down on the guide-pins c, whereby the instrument-table A is allowed to approach the working surface B in a yielding and also

resilient manner, for a purpose more fully explained hereinafter.

Owing to the fact that the ends of the springs D rest in the recesses c^5 in the upper faces of the respective base-pieces C' accidental rotation of the base-pieces about the standards C is prevented.

To prevent the base-pieces from slipping on the drawing-paper or other working surface B, the said base-pieces are each provided on their lower surfaces with a suitable cushion-facing—as, for instance, the india-rubber facing c^7, Fig. 3—which may be cemented or otherwise secured to the said base-pieces.

To add to the stability of the instrument-table A, the standards C are preferably, but not necessarily, attached thereto at a slight angle from the vertical—that is to say, said standards C flare outward, as shown in Fig. 6. Furthermore, in order to permit the device to be packed in as small a space as possible the said standards C, with their attached base-pieces C', are removably connected to the instrument-table A by screws c^8, and in order to take all lateral or shearing strain off said screws I provide the upper end of each standard C with two dowel-pins c^9, Fig. 3, which are fixed in the standards and enter corresponding holes in the ends of the arm of the instrument-table A. One of these dowel-pins c^9 is shown in dotted line on Fig. 6. These dowel-pins also assist in the assembling of the parts and maintain the standards in proper position relative to the instrument-table A.

Beneath the instrument-table A is movably attached a scribing-beam, which consists, preferably, of two parallel bars E E', connected at the ends by plates e, which are screwed to the ends of the said parallel bars by means of screws e'. The said bars E E' serve as runners for the three blocks F F' F², which have each two holes, through which the said parallel bars extend, as shown in Fig. 4. The block F, which I will term the "center" block, may be held fixedly to the parallel bars, usually at substantially the center of the length of the same, by an ordinary screw f, Fig. 4. A needle or pointer f' extends downward from the center of the under face of said center block F for a purpose hereinafter explained. The block F' may be adjusted along the parallel bars E E' and clamped at any desired point by a clamping thumb-screw f^2, Fig. 4. The block F² is also adjustable along the parallel bars E E' and may be clamped at any desired point by means of a thumb-screw f^3, Fig. 4. The said block F² is provided with a tool-socket at its center, as indicated at f^4, Figs. 4 and 9, this socket having a feather or spline f^5, Fig. 9, arranged to enter a key seat or slot f^6, Fig. 10, in the tool or point which may be inserted in the socket, whereby rotation of such tool is avoided. In Fig. 10 I have shown three tools or points such as are commonly used, the first, G, being a pencil-holder having conical slitted resilient tubular jaws g, arranged to receive the lead g', Fig. 9, the jaws being clamped upon the lead by the usual conical ferrule g^2, Fig. 9, which is screwed to the pencil-holder. At G', Fig. 10, is shown a pen, and at G² a cutting-wheel tool. These tools are interchangeable in the tool-socket (shown at f^4, Fig. 4) and may be clamped therein by a thumb-screw f^7.

One of the parallel bars—as, for example, the bar E—is graduated on its outer side, as shown in Fig. 2, and each of the blocks F F' F² is provided with a hole or opening, as shown at f^8 f^9, Fig. 2, and at f^{10}, Fig. 1, and with an index or central mark on its outer face above or below its opening, as indicated at f^{11} f^{12} f^{13}, Figs. 1 and 2, whereby it is possible to readily adjust said blocks F F' F² at any desired points along the bar by sliding the respective blocks along the bars until the desired graduation appears at the respective opening in the block in line with the corresponding index, whereupon the block may be clamped.

The adjustable blocks F F' are each provided with a slide-block H H', Figs. 6, 7, and 8, arranged to enter the slots in the instrument-table, one of these slide-blocks—as, for example, the block H—being arranged to move longitudinally in the slot a, while the other slide-block H' is arranged to move longitudinally in the slot a', each block being somewhat longer than the width of the slots in order that it may pass the slot transverse to that in which it moves without entering the same. In order to hold the slide-blocks H H' to their respective blocks F F', the former are provided with holes through which pass pivot-studs h h', provided with reduced ends h^2 h^3, Figs. 7 and 8, whereby shoulders are formed on the said studs, the reduced ends being screwed into the respective blocks F F' until the shoulders contact with said blocks. The studs are each provided with heads h^4 h^5, which extend across the respective slots a a', and thus serve to keep the scribing-beam in close contact with the lower face of the instrument-table A, and yet allow a free angular movement of said beam.

In constructing the instrument the distance from the shoulders on the studs h h' to the under sides of the heads h^4 h^5 should be substantially equal to the thickness of the instrument-table, so that when the said studs h h' are screwed tightly into their respective blocks the heads h^4 h^5 cannot clamp the scribing-beam to the instrument-table sufficiently to prevent movement of the said beam.

The top of the instrument-table is preferably divided into degress, as indicated in Figs. 1 and 5, thus serving as a protractor.

In using an ellipsograph embodying my improvements—for example, to draw an ellipse on paper forming the drafting or working surface B—first two lines x x and y y, Fig. 1, are drawn upon the paper at right angles to

each other. The block F^2 is then adjusted so that its distance from the block F is equal to half the minor axis of the desired ellipse. The block F′ is then adjusted so that its distance from the block F^2 is equal to half the major axis of the ellipse. The instrument is then arranged with the center point f' over the intersection z of the major and minor axes of the ellipse, the base-pieces C′ being at right angles to the minor axis, as shown in Figs. 1 and 5. In order to aid in thus locating said base-pieces, they may each be provided with an index-mark, preferably on the outside faces, one of these index-marks being shown at K, Fig. 2, which marks may be placed in alinement with the minor axis. If desired, however, the index-marks may be on the inside faces. The instrument being thus placed, the instrument-table is held with the left hand while the scribing-beam is moved by the right hand, whereby the ellipse is struck. By the application of suitable pressure on the instrument-table A during the operation of the scribing-beam the supports are caused to yield, whereby the working point (pencil, pen, cutter, or the like) is brought into contact with the paper with sufficient pressure to allow it to perform its functions properly. Upon a removal of this pressure the tool or point is withdrawn from the drafting or working surface, owing to the resiliency of the springs D. This is a great advantage, as thereby either a light or heavy line can be drawn, as desired, by varying the pressure on the instrument-table with one hand, while the other hand is devoted solely to producing an angular movement of the scribing-beam.

For drawing ellipses at one complete revolution of the scribing-beam it is necessary that the beam shall be able to pass between the supports of the instrument-table A, and hence in the general construction of the instrument when operating in this way the center block F will be substantially at the center of the parallel bars E E′; but portions of the arc of larger ellipses may be produced by clamping the block F′ at one end of the scribing-beam and then adjusting the block F^2 at a distance from the said block F′ equal to half the major axis of the desired ellipse and the block F at a distance from said block F^2 equal to half the distance of the minor axis of said ellipse. In this adjusted position the scribing-beam cannot pass the supports of the instrument-table, and hence only somewhat less than half the ellipse can be drawn. The whole instrument can then be turned half-way around and another part of the ellipse drawn in the same manner. The remaining portion of the ellipse may then be drawn in with the usual compasses or by an irregular curve.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drafting instrument, the combination with an instrument-table, and a drafting-tool carried thereby and movable in a plane parallel with the drafting-surface, of a resilient supporting mechanism for the said instrument-table, whereby the instrument-table may be pressed toward the drafting-surface, and will move back therefrom upon the removal of the pressure.

2. In a drafting instrument, the combination with an instrument-table, and a scribing-beam carried thereby, and movable, relatively to the instrument-table, only in a plane parallel with the drafting-surface, of a drafting-tool carried by said beam, and a resilient supporting mechanism for the said instrument-table.

3. In a drafting instrument, the combination, with an instrument-table, and a drafting-tool carried thereby and movable in a plane parallel with the drafting-surface, of two resilient devices arranged to support the table.

4. In a drafting instrument, the combination, with an instrument-table, and a drafting-tool carried thereby and movable in a plane parallel with the drafting-surface, of a standard connected to the said table, a base-piece, and a resilient connection between the base-piece and the standard.

5. In a drafting instrument, the combination, with an instrument-table, and a drafting-tool carried thereby and movable in a plane parallel with the drafting-surface, of a standard connected to said table, a base-piece, and a spring device intermediate the base-piece and standard.

6. In an instrument of the class described, the combination with an instrument-table, of a standard connected to said table, a base-piece, a guide-pin connecting the base-piece and standard in a manner to allow a relative motion between the two, and an elastic device normally tending to force the standard away from the base-piece.

7. In an instrument of the class described, the combination, with an instrument-table, of a standard connected to said table, a base-piece, a guide-pin connected to the base-piece and arranged to move in a hole in the standard, and a spring secured to the bottom of the standard and bearing on the base-piece.

8. In an instrument of the class described, the combination, with an instrument-table, of a standard connected to said table, a base-piece, a resilient connection between the base-piece and the standard and means for preventing the accidental rotation of the base-piece relative to the standard.

9. In an instrument of the class described, the combination, with an instrument-table, of a standard connected to said table, a base-piece provided with a recess, a guide-pin uniting the base-piece and standard to allow a relative motion between the two in a vertical direction, and a spring secured to the standard and arranged to engage the recess in the base-piece.

10. In an instrument of the class described,

the combination, with a standard connected to said table, of a base-piece provided with recesses near each end, a guide device connecting the standard and base-piece in a manner to allow a vertical movement of the standard relative to the base-piece, and a bow-spring secured to the standard and having its ends resting in the recesses in the base-piece.

11. In an instrument of the class described, the combination, with an instrument-table, of a standard having an opening whereby a transverse bar is formed, said transverse bar having a pin-hole, a base-piece, a guide-pin secured to the base-piece and extending freely through the pin-hole in the transverse bar of the standard, said guide-pin having a stop device at its projecting end in the opening of the standard, and an elastic device normally tending to force the standard and base-piece apart.

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

GERTRUDE MITCHELL KING.

Witnesses:

SARA WINTHROP SMITH,

SARA ELISA MILDHAM.