

W. LEHNER.
ELLIPSOGRAPH.

No. 520,003.

Patented May 15, 1894.

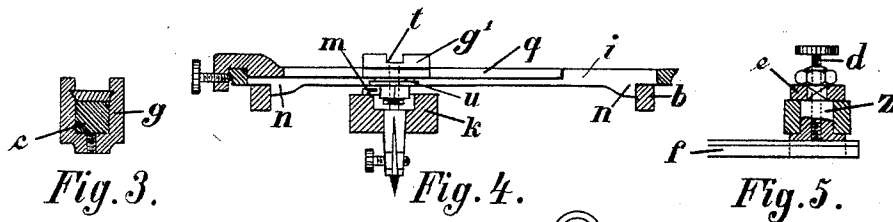
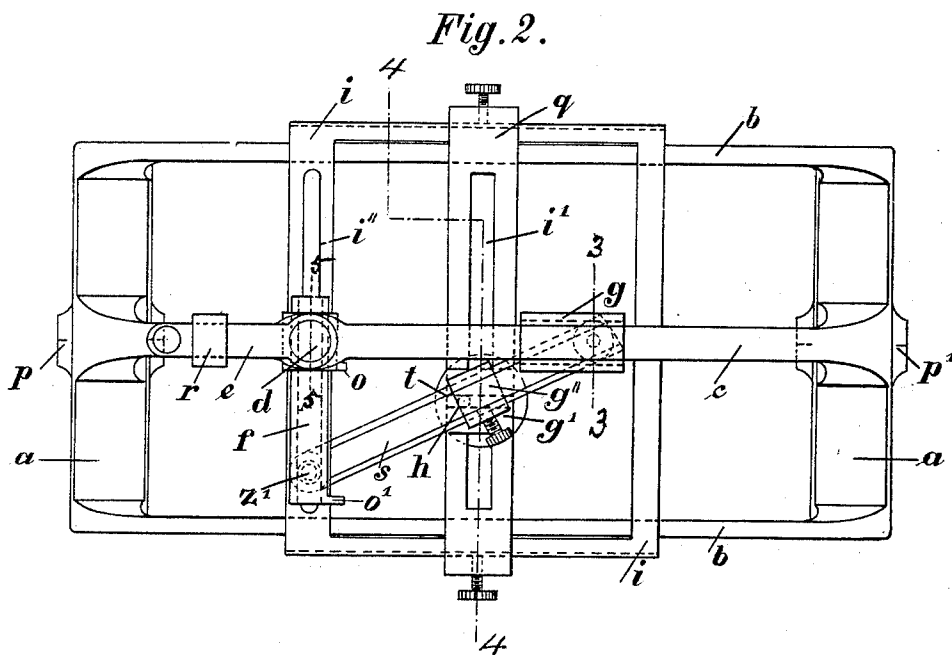
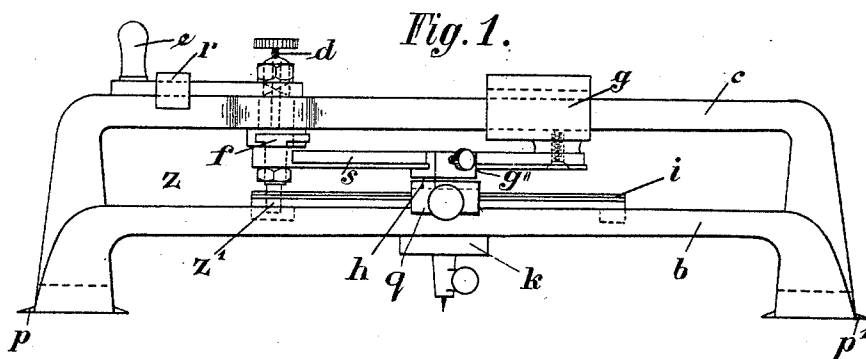


Fig. 6.

Attest
Walter D. Sullivan
James M. Spear

Inventor
Wilhelm Lehner
by Ellis Spear
Att'y.

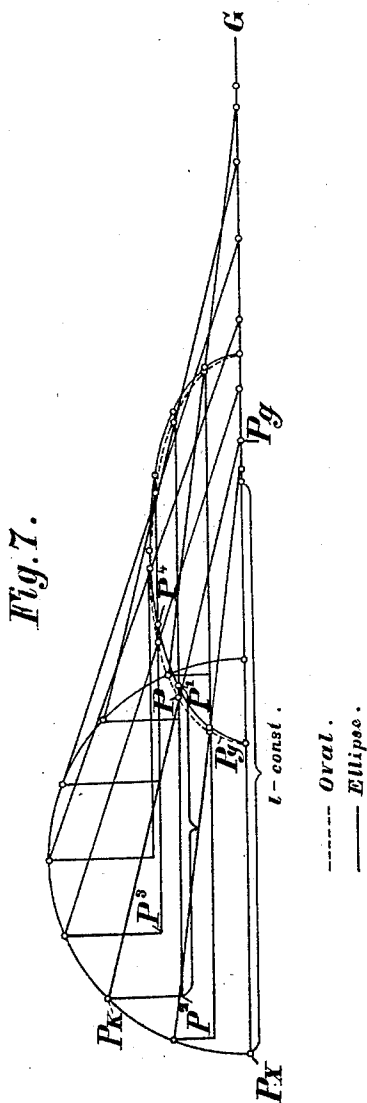
(No Model.)

2 Sheets—Sheet 2.

W. LEHNER.
ELLIPSOGRAPH.

No. 520,003.

Patented May 15, 1894.



Attest
Matter maldon,
James M. H. H.

Inventor
Wilhelm Lehner
by Ellis Spear-
Att'y.

UNITED STATES PATENT OFFICE.

WILHELM LEHNER, OF MUNICH, GERMANY.

ELLIPSOGRAPH.

SPECIFICATION forming part of Letters Patent No. 520,003, dated May 15, 1894.

Application filed July 14, 1893. Serial No. 480,503. (No model.)

To all whom it may concern:

Be it known that I, WILHELM LEHNER, electrical student, of 45 I Amalienstrasse, in the city of Munich, in the Empire of Germany, have invented new and useful Improvements in or Connected with Ellipsographs, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in or connected with ellipsographs and consists in an ellipsograph whose construction is based on the planimetric principle herein described with reference to the diagram Figure 7 in the accompanying drawings.

If the end point Pk of a line Pk — Pg , describes a circle while the other point Pg moves along a straight line G passing through the center of the circle, the several points of the straight line Pk — Pg between the two end points, for instance the point P , will describe ovals. These ovals become ellipses, when, in every position of the line, the point P that describes the oval is moved parallel to the straight line G toward P' so that the lines Px — $P'y$ $P'P^2$, and P^3P^4 , &c., remain constant being cut by the perpendicular lines from Pk and P' to the line G at equal distances apart.

In the accompanying drawings Fig. 1, is an elevation of an ellipsograph constructed in accordance with my invention. Fig. 2, is a plan view of the same. Fig. 3, is a section on line 3—3 of Fig. 1. Fig. 4, is a section on line 4—4. Fig. 5, is a section on line 5—5, and Fig. 6, is a plan of the disk u (Figs. 2 and 4), and Fig. 7 is a diagrammatic view illustrating the construction of the ellipse.

On this principle is based the construction of the ellipsograph forming the subject of this invention which is illustrated in the accompanying drawings.

The main portion of the instrument is formed by a framing which consists of two end portions a and two side portions b , and carries in the middle the elevated longitudinal stirrup bar c . This bar c is perforated for the purpose of receiving a crank mechanism which is illustrated in section in Fig.

5. A crank handle e is fixed on the square portion of the spindle or stud z . The lower portion of the pin z serves as a guide for the

horizontal arm f . The horizontal arm f is arranged perpendicularly to the crank handle e and is capable of movement on the base of the spindle or stud z , and can be fixed by means of the set screw d (Fig. 1). On the end of the horizontal arm f is a pin z' which when the crank handle is rotated carries one end of a rod s round with it in a circle. At its other end the rod s moves by means of the sliding piece g along the stirrup bar c . Thus the rod s corresponds to the line l shown on (Fig. 7). On s is the movable sliding piece g'' which is capable of being fixed by a set screw and is furnished with the pin h . The movable sliding piece g'' and with it the pin h describes when the crank handle is rotated an oval according to the planimetric construction. Now this oval is converted by the ellipsograph forming the subject of this invention into an ellipse with the help of the following parts. The frame i slides with its guides n (Fig. 4) along the bars b which are parallel to the stirrup bar c . The distance $P'P^2$, Fig. 7, or the distance between the perpendiculars from Pk and P' upon G which is a constant, is represented in the ellipsograph by the distance of the longitudinal centers of the two slots i' and i'' which are set or rendered invariable or fixed when the ellipsograph is in use. In one slot i'' the pin z' moves correspondingly to Pk (Fig. 7) along an arc of a circle and carries with it the frame i and cross bar q with their slots i' and i'' which correspond to the perpendiculars from Pk and P' upon G (Fig. 7). Now the sliding piece g' which describes the ellipse is fitted in the slot i' so that it (g') can slide along the cross piece q and the said sliding piece g' is provided with the slot t (parallel to the elevated longitudinal stirrup bar c) in which the pin h of the movable sliding piece g'' works and the said movable sliding piece g'' is operated by the pin h . The part g' carries a vertically movable lead pencil-holder which is weighted with a weight k (Fig. 4). The said lead pencil-holder can be raised clear of the paper when required and be kept in the raised position by the engagement of a nose or catch m in a disk u .

The abscissa produced by the sliding piece g' and the point of the lead pencil is fully determined by the position of the pin z' (corre-

sponding to the point Pk Fig. 7) and by the constantly preserved distance of the centers of the two slots i' and i'' from each other and this distance corresponds to the two perpendicular lines from Pk and P' to the line GPx (Fig. 7). Since the ellipse is formed from the oval by the movement of the several points of the latter parallel to G (Fig. 7) therefore analogously the sliding piece g' is provided with a groove t parallel to c in which groove the pin h moves.

The use of the apparatus is as follows:—
The major and minor axes of the ellipse to be described being given, the horizontal arm f is moved until the distance of two markers or indicating lines o and o' from each other is equal to half the major axis (the markers o and o' having been moved out an equal distance from d and z') and the arm is then fixed by means of the clamp screw (d). Then the instrument is set by means of the markers or indicating lines p and p' to a straight line with the direction of which the major axis of the ellipse, to be drawn, coincides, the hand crank e is now clamped on the stirrup bar by means of a sliding clamp r . The arrangement is now such that the horizontal arm f is at right angles with the stirrup bar c ; then the cross arm q and the sliding piece g' are moved until the point of the lead pencil comes over a line drawn parallel to the major axis through the

end point of the half of the minor axis. Then the cross arm q and the movable sliding piece g' are fixed by means of the set screws; the sliding clamp r is removed from the hand crank e and the handle of the hand crank e is moved round in a circle, whereupon the point of the lead pencil describes the mathematically exact ellipse required.

What I claim, and desire to secure by Letters Patent of the United States, is—

An ellipsograph comprising the main frame, a supplemental frame sliding thereon, a central bridge piece c , having vertical crank shaft journaled therein, a swinging arm on the lower end of said shaft having an adjustable pin engaging a slot in the supplemental frame, a bar s having one end secured to said adjustable pin and the other end sliding on the bridge piece, a slotted cross bar mounted on the supplemental frame, and a sliding piece mounted on the bar s and guided by said slotted cross bar and a pencil or marker connected to said sliding piece, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILHELM LEHNER.

Witnesses:

OTTO BACHMAYR,
EMIL STAIGER.