J. HARDT.

ELLIPSOGRAPH.

APPLICATION FILED MAR. 10, 1921.

1,411,493. Patented Apr. 4, 1922.

Fig. 1.

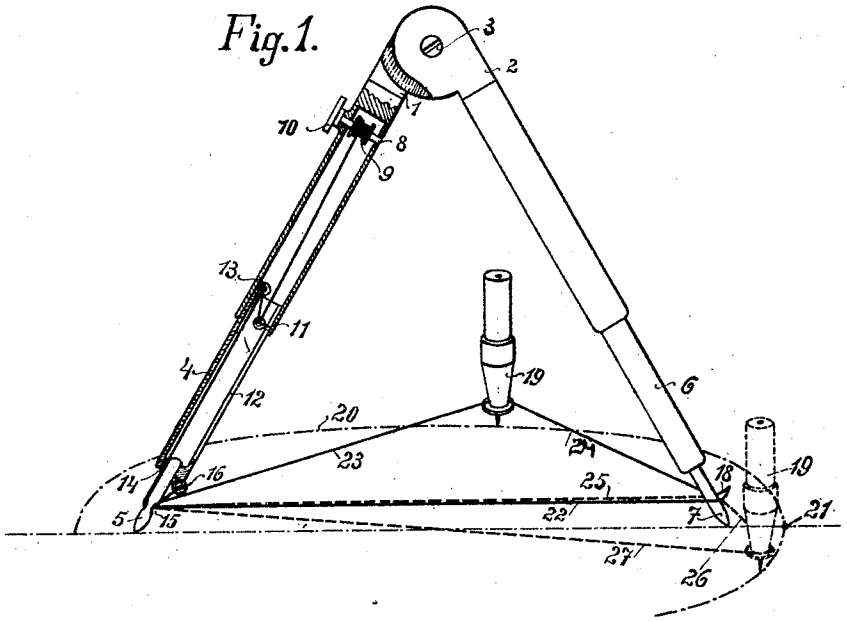
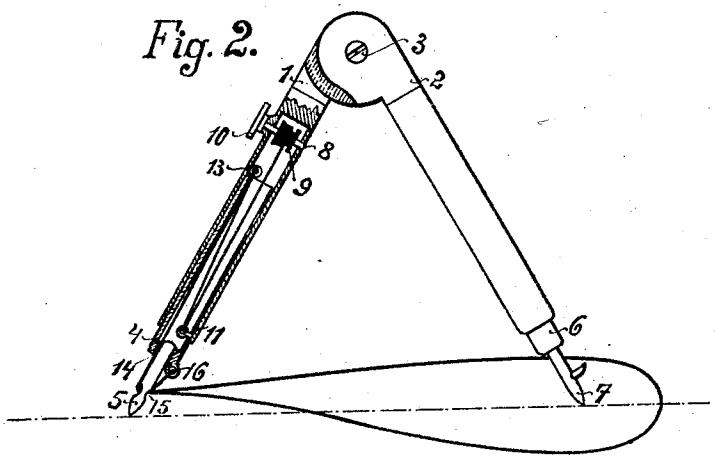


Fig. 2.



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ELLIPSOGRAPH.

1,411,493. Specification of Letters Patent. **Patented Apr. 4, 1922.**

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To all whom it may concern:

Be it known that I, JOHANN HARDT, a citizen of the German Republic, residing at Hindenburg, Germany, have invented certain new and useful Improvements in Ellipsographs, of which the following is a specification.

This invention relates to ellipsographs of that type in which the ellipse is drawn with the aid of a string whose ends are fixed at the points where the foci of the ellipse are situated.

With the ellipsographs of this type of known construction the ends of the string are fixed each in separate points of the compasses. If now the string is stretched with the aid of a pencil or the like so that the ellipse might be drawn along the string, only one half of the ellipse can be drawn by the pencil at the time, as for drawing the other half of the ellipse the string has to be placed at the other side of the foci.

Owing to this invention a full ellipse can be drawn with the pencil as the string used is of a length which is equal to the sum of the radii vectors plus the distance between the two foci, its two ends being attached to one of the points of the compasses, the other point of the compasses being inserted in the loop formed by the string.

The shanks of the compasses are preferably made of telescopically adjustable parts and provided with guide pieces for the string so that when the movable parts of the shanks are pushed into the fixed part the string is shortened automatically. This shortening of the string is necessary as the distance between the points of the compasses becomes shorter, with the same angular position of the shanks, if said shanks are shortened.

In order that the invention may be clearly understood, I shall proceed to describe the same with reference to the example of construction shown in the accompanying drawings, wherein:—

Fig. 1 shows the improved ellipsograph, one shank in elevation and the other shank in section, the shanks being pulled out to their full length.

Fig. 2 is a similar view, the shanks of the compasses being shortened.

The shanks 1 and 2 of the compasses which are pivotable around a pivot pin 3 are tubular. The tubular part 4 telescoped in the shank 1 carries the fixed point 5. In the tubular shank 2 the tubular part 6 is telescoped which carries the point 7. An axle 8 is revolubly mounted in the upper end of the tubular shank 1. A grooved pulley 9 is keyed upon the axle 8. A hand wheel 10 fixed upon the projecting end of axle 8 serves for revolving said axle.

To the lower end of the tubular shank a guide piece 11 for the string is arranged which is adapted to slide in a guide slot 12 of the tubular part 4 when this tubular part is pushed upwards in the shank 1. A second guide piece 13 for the string is provided at the upper end of the tubular part 4. One end of the string is attached to the grooved pulley 9 and the string, conducted through the guide pieces 11 and 13, comes out of the tubular part 4 at 14 to be further conducted through the eye 15 of the point 5 to form a loop. The second end of the string is conducted back through the eye 15 of the point 5 and attached to the ring 16 provided at the lower end of the tubular part 4. The point 7 of the compasses is inside the loop formed by the string as shown in Fig. 2. This point 7 has a laterally projecting guide pin 18 for the string. The length of the string is regulated by means of the hand wheel 10 so that the length of the part of the string which forms the loop is equal to the sum of radii vectors of one focus of the ellipse plus the distance between the two foci of the ellipse. The compasses are adjusted so that the points can be stuck into the foci of the ellipse, the point 7 being situated inside the loop of the string. The string is now stretched as usual with the aid of a pencil 19.

While one half of the ellipse 20 is being drawn by the pencil 19 (as shown in Fig. 1) the part 22 of the string remains stretched between the points 5 and 7 of the compasses. The parts 23 and 24 of the string form the visual rays of the ellipse and this half of the ellipse can be drawn in the well known manner.

It is however no longer necessary to lift the pencil 19 at the point 21 as the part 23 of the string will now form a straight line between the points 5 and 7 of the compasses when the pencil is moved in the same direction as indicated by dotted lines, said part 23 of the string corresponding in length with the distance between the two foci, the parts 26 and 27 of the string forming the radii vectors. The ellipse can therefore be drawn

without interruption. The pin 18 prevents the string from sliding up the point 7 of the compasses.

When the angle between the two shanks 1 and 2 remains the same, and the tubular parts 4 and 6 are pushed up in the tubular shanks 1 and 2 the distance between the points 5 and 7 of the compasses is reduced, the loop 25 being reduced at the same time by means of the guide pieces 11 and 13 in approximately the same measure as the distance between the points is reduced.

The end of the string which is attached to the ring 16 could be fixed to the pulley 9 after having been conducted through the guide pieces 13 and 11. In this case the string would be shortened for double the length for which it is shortened otherwise when the parts 4, 6 of the shanks are pushed up into the tubular shanks 1, 2.

I claim:—

1. An ellipsograph of the type in which a string is used for drawing the ellipse comprising in combination two shanks pivotally connected at their upper ends composed each of an upper tubular part and a lower tubular part telescoped in said upper tubular part, points fixed in both lower tubular parts, a string both ends of which are attached to one of said shanks and forming a loop outside of said shank, and means for guiding one end part of said string in the shank to which it is attached.

2. An ellipsograph of the type in which a string is used for drawing the ellipse comprising in combination a shank consisting of an upper tubular part, of a lower tubular part telescoped in said upper part, the lower part having a guide slot in one side and a point fixed in the lower end and having an eye, a second shank composed of an upper tubular part, a lower tubular part telescoped in said upper part, a point fixed in said lower part, a pin pivotally connecting the upper ends of said shanks, an axle revolubly mounted in the upper end of the first mentioned shank so that one of its ends projects from the wall of the shank, a hand wheel upon said projecting end, a grooved pulley keyed upon said axle within said shank, a guide piece fixed in the upper tubular part of said first mentioned shank at the lower end of the same and engaging with the slot of said lower tubular part, a guide piece fixed in the upper end of said lower tubular part, a ring at the lower end of said tubular part, a pin laterally projecting from the point of said second shank, and a string fixed with one end to said pulley, conducted through said guide pieces and through said eyelets, forming a large loop placed around the point of the second shank under said pin, the second end of said string being conducted through said eye and attached to said ring. substantially as described and shown and for the purpose set forth.

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

JOHANN HARDT.

Witnesses:
W. WIRTH,
FERD. VIETTEGER.