R. E. MORITZ.

CYCLOHARMONOGRAPH.

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1,126,252. Patented Jan. 26, 1915.

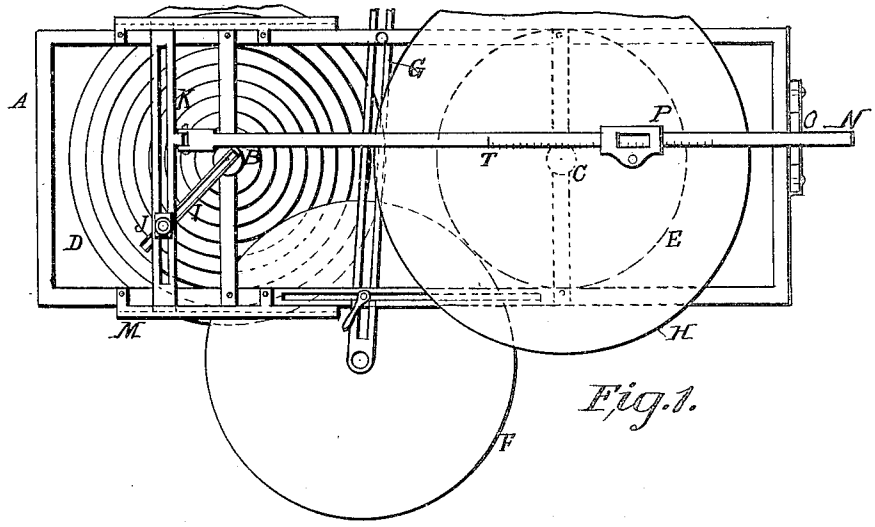


Fig. 1.

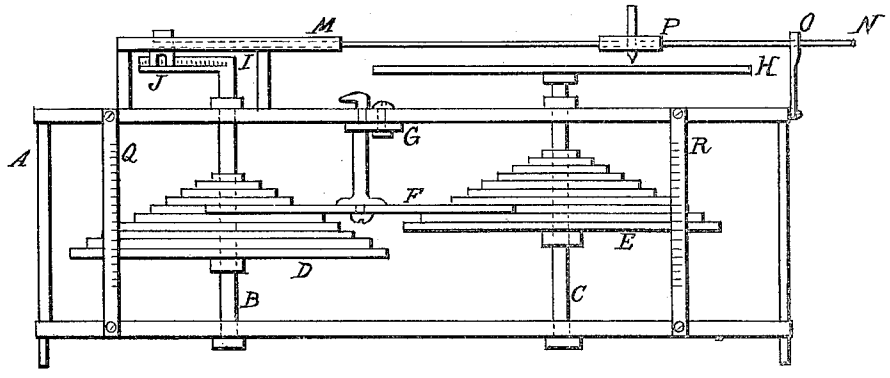


Fig. 2.

WITNESSES

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CYCLOHARMONOGRAPH.

1,126,252. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed June 29, 1914. Serial No. 847,968.

To all whom it may concern:

Be it known that I, ROBERT EDOUARD MORITZ, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Mechanism Which is to be Known as the Cycloharmonograph, and of which the following is a specification.

The object of the mechanism is to trace plane curves whose equation is

$$\varsigma = a \cos.\frac{p}{q}\theta + k,$$

where ς and θ are polar coördinates, a, p, q, and k arbitrary constants. This object is attained by the automatic composition of two simple motions, the simple harmonic motion

$$\varsigma = a \cos. pt + k$$

and the uniform circular motion

$$\theta = qt,$$

t in each case being the time during which the motions continue. The composition of these motions is effected by means of the mechanism illustrated schematically in the accompanying drawing in which—

Figure 1 represents the top view and Fig. 2 a side view.

Like letters are used to represent the same parts in both views.

A frame-work A supports two shafts B and C each of which carries a set of gears D and E. Each of these sets of gears admits of being raised or lowered and of being clamped at any desired position on the shaft so that any gear-wheel of either set may be brought into the plane of the idle-wheel F which serves to connect the two sets of gears. The necessary adjustment in the position of the idle-wheel for the various combinations of gears is effected by means of the slotted bar G which carries the idle-wheel.

The shaft C has secured to its upper extremity a circular disk H which serves to hold the paper on which the curve is to be traced.

The shaft B terminates in a crank-arm I to which is clamped a crank-pin J. This crank-pin works in a slide K whose extremities move in two grooved parallel guides L and M. Near the middle of the slide K is fastened the tracer-arm N which slides in a fixed support O and carries the tracer-slide P for the reception of the tracing-pencil or pen.

The tracer-arm N and the crank-arm I may be graduated in inches or centimeters to facilitate in the setting of the tracer-slide P and the crank-pin J at various distances. Two graduated scales Q and R facilitate the adjustment of the various gears to the plane of the idle-wheel F.

The tracer-arm N is hinged at S to admit of the tracer-arm being lifted while the paper is fastened to the disk H.

The gears in the mechanism may be replaced by friction disks or by pulleys driven by belts.

The *modus operandi* of the mechanism is as follows: The gear-wheel of diameter p of the set E and the gear-wheel of diameter q of the set D are connected by the idle-wheel F. The crank-pin J is set at the distance a from the center of the shaft B and the tracer-slide P is set at the distance k from the neutral point T of the tracer-arm N. A sheet of paper is fastened to the disk H and the pencil or pen-point is brought in contact with the paper. Any rotary motion imparted by the hand to the idle-wheel F will be transmitted both to the disk H and the crank-arm I. The crank-arm causes forward and backward motion of the slide K and consequently the tracing-pencil or pen will describe a simple-harmonic motion in the direction of the tracer-arm N. The composition of this motion with the circular motion of the paper on the disk H results in a curve whose equation is

$$\varsigma = a \cos.\frac{p}{q}\theta + k.$$

I am aware that prior to my invention various mechanisms have been made for the tracing of certain curves represented by the equation

$$\varsigma = a \cos.\frac{p}{q}\theta + k,$$

such as the circle, the cardioid, the common limacon, and the roses or foliate curves.

But I am not aware of the existence prior to my invention of any mechanism for the tracing of every curve represented by the aforesaid equation.

I claim:

In a drafting device, a frame, a work support rotatably mounted in said frame, a marker carrier slidably mounted on said frame above said support, and means for simultaneously rotating said support, and rectilineally reciprocating said carrier.

ROBERT EDOUARD MORITZ.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."