(No Model.)

E. HIGGINS.

PLANIMETER.

No. 301,594. Patented July 8, 1884.

Fig. 2

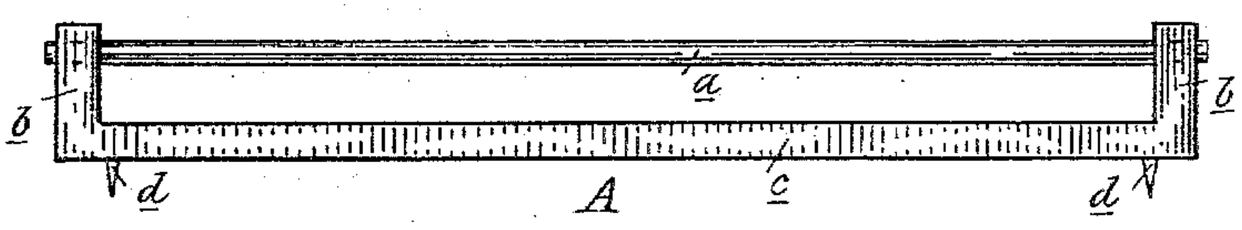
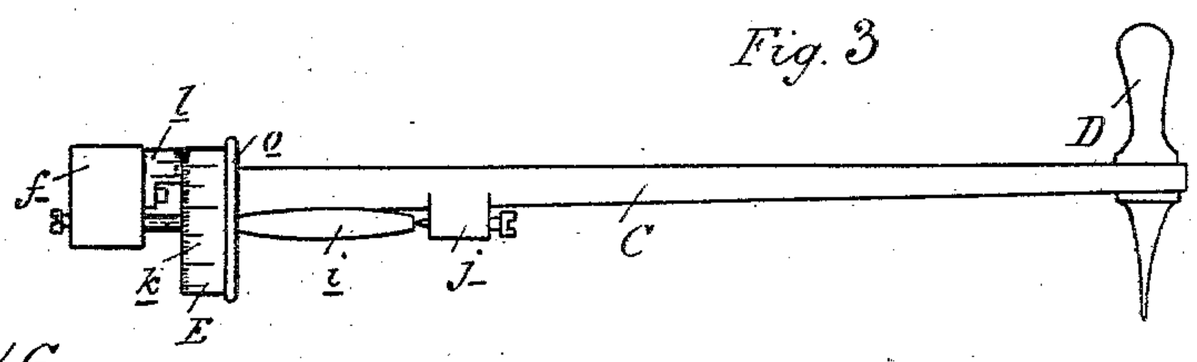


Fig. 3



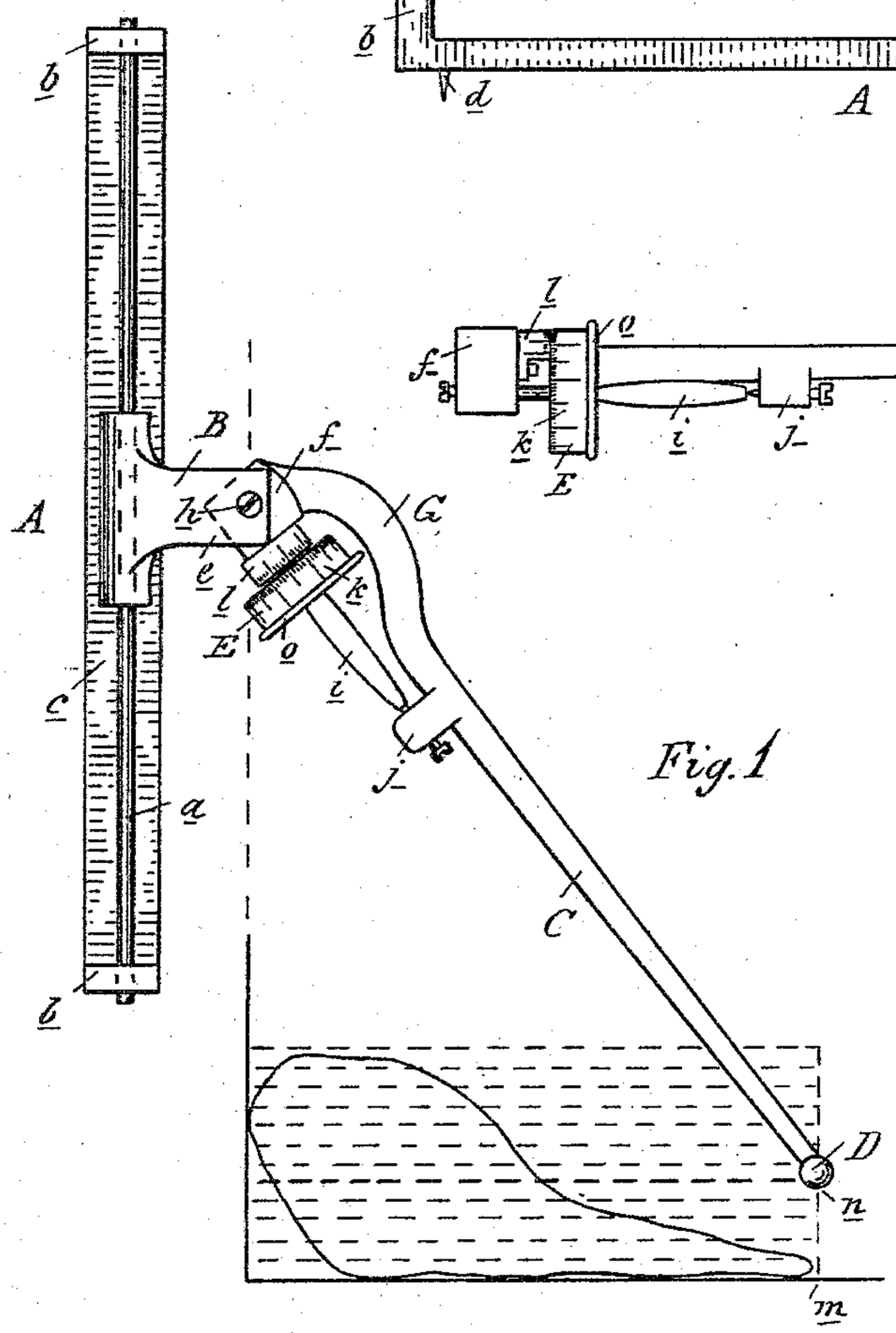


Fig. 1

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EUGENE HIGGINS, OF LANSING, MICHIGAN.

PLANIMETER.

SPECIFICATION forming part of Letters Patent No. 301,594, dated July 8, 1884.

Application filed March 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, EUGENE HIGGINS, of Lansing, in the county of Ingham and State of Michigan, have invented new and useful Improvements in Planimeters; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in planimeters of the kind used for measuring superficial contents; and the object of my invention is to simplify its construction and adapt it to give only direct readings, so as to facilitate its use by persons adverse to the use of more complicated instruments, which, although their scope is generally more extended, require certain calculation to arrive at the results sought for, and are therefore liable to confuse. My improved planimeter is especially adapted to form a measuring device for indicator-diagrams, and facilitate certain graphical methods in connection therewith—as, for instance, ascertaining the mean pressure of a given indicator-diagram, all as hereinafter more fully described and shown.

In the drawings which accompany this specification, Figure 1 is a plan view of my device complete. Fig. 2 is a side elevation of the guide-frame detached. Fig. 3 is a side elevation of the tracer-leg detached.

A is the guide-frame, which consists of the round guide-bar *a*, held upon its ends in the standards *b b*, formed by the upturned ends of the flat bar *c*. This latter bar is provided upon its under side with two or more steel pins, *d*, by means of which it can be firmly secured in place on a table or drawing-board.

B is a cross-head sleeved upon the guide-bar *a*. It is provided with two cheeks, *e e*, adjustably or integrally secured thereto.

C is the tracer-leg, provided at the inner end with the head *f*, and upon its outer end with the tracer-point D.

G is a bend or curve in the inner portion of the tracer-leg.

h h are screw-pivots, by means of which the head of the tracer-leg is pivotally secured between the cheeks *e*.

E is the measuring-wheel, secured upon an arbor, *i*, one end of which is journaled in a lug, *j*, cast on the tracer-leg, while the opposite end is journaled in the head *f*. To secure the utmost delicacy of the instrument it is necessary to journal the arbor *i* between steel points, or in any other suitable way for mounting the arbors of delicate mechanism. The measuring-wheel E is provided with two faces. The one of smaller diameter has a scale, *k*, registering with a fixed index, *l*, provided with a zero-mark, and, if desired, with a vernier. The other face of the measuring-wheel is merely a rim, *o*, either plain or milled, but of a larger diameter than the face bearing the scale. The axis of the arbor *i* should be in a vertical plane passing through the pivots *h* and the tracer-point D.

As the instrument is designed to give direct readings, the scale *k* must be constructed with that end in view; but as the theory involved is well understood by scholars in mathematics I abstain from giving the *modus operandi* of constructing this scale.

The application of the instrument is similar to other instruments of the kind, and is as follows: Suppose we want to find the area of an indicator-diagram. Place the parts in position upon a table or drawing-board, as shown in Fig. 1. Then begin to trace once completely around the diagram, following closely the outline thereof, and taking care that the tracer-wheel will come in contact with the face of the indicator-card or other plane surface placed underneath it, so that it will readily travel by frictional contact therewith. Now, if at the beginning of the tracing the measuring-wheel E has been so adjusted that the zero-mark of its scale registers with the fixed index or zero-mark, the final reading of the scale after the tracing of the indicator-diagram is completed will give the superficial contents of the diagram. If we now put the tracing-point upon the point *m*, which is in the atmospheric or in the vacuum line, and adjust the tracing-wheel so that the reading corresponds with the reading obtained by tracing the outline of the diagram, then trace perpendicularly upward until the zero-mark on the tracing-wheel corresponds with the fixed zero-mark, we obtain a point, *n*. The distance *m n* multiplied by the scale of the diagram equals the mean effective pressure in pounds per square inch.

To obtain great exactitude it is necessary that the diagram and instrument be placed in the proper relative positions to obtain at all times a free and easy travel of the measuring-wheel; but a little familiarity with the instrument by practice will easily teach the operator.

The instrument can be put to a variety of other uses, especially for graphical demonstrations, which it has in common with other planimeters, but which in many cases are simplified by the fact of its giving direct readings of the superficial contents.

To adapt the instrument to be stowed in a small compass I make the guide-bar *a* so that it may be removed from the standards *b*, and free the cross-head B from its engagement.

What I claim as my invention is—

1. In a planimeter, the combination of the following parts: a rectilinear guide-frame provided with an elevated guide-bar, *a*, and points *d*, for securing it in place, a cross-head adapted to travel on said guide-bar, a tracer-leg pivoted to the cross-head, and provided with a tracer-point, and a measuring-wheel revolving in a plane at right angles to the tracer-leg, all combined and arranged substantially as set forth.

2. In a planimeter, the combination of the cross-head B, tracer-leg D, and measuring-wheel E, substantially as described, with the round guide-bar *a*, standards *b*, bar *c*, and pins *d*, all arranged and combined substantially as described.

EUGENE HIGGINS.

Witnesses:
S. E. JARVIS,
W. T. HEBBARD.