Feb. 9, 1926. 1,572,132

L. LARRAZABAL Y FERNANDEZ

PLANIMETER

Filed Dec. 5, 1922

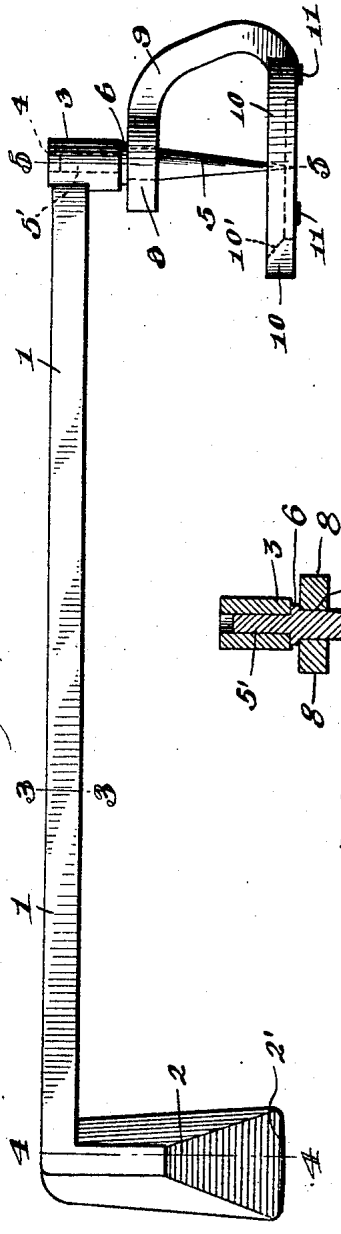

Fig. 1.

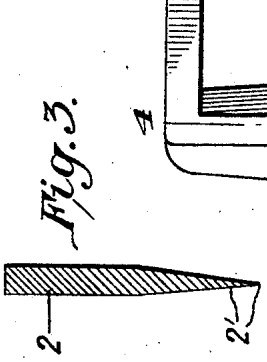

Fig. 3.

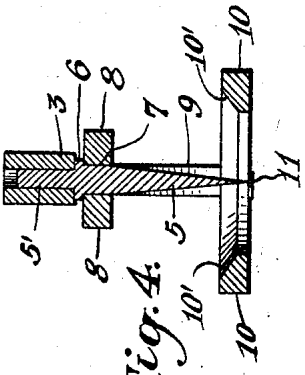

Fig. 4.

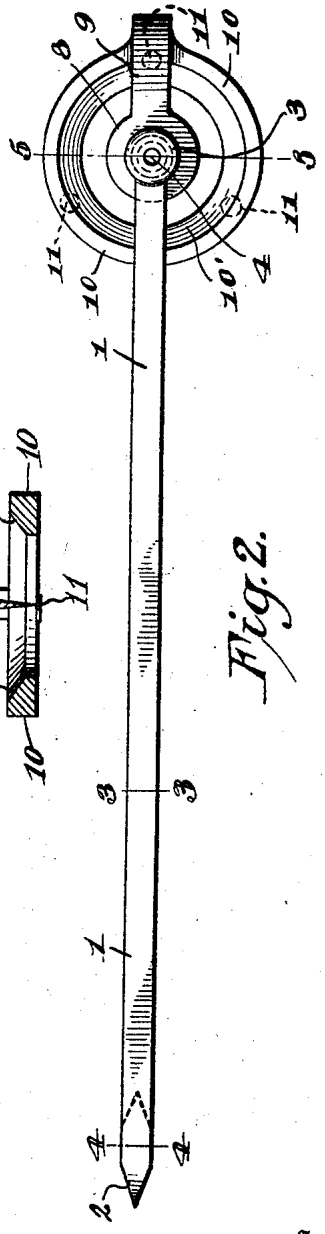

Fig. 2.

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UNITED STATES PATENT OFFICE.

LUIS LARRAZABAL Y FERNANDEZ, OF HABANA, CUBA.

PLANIMETER.

Application filed December 5, 1922. Serial No. 605,118.

To all whom it may concern:

Be it known that I, LUIS LARRAZABAL Y FERNANDEZ, a citizen of the Republic of Cuba, and resident of Habana, Cuba (whose postal address is Villegas No. 106, Habana, Cuba), have invented certain new and useful Improvements in Planimeters, of which the following is a specification.

This invention relates to planimeters or instruments for measuring surfaces and its object is to effect improvements in the construction of the same whereby the same is rendered stable, may be readily manufactured at small cost, and may be readily operated.

With the above and other objects in view the invention consists in the construction, combination and arrangement of devices hereinafter described and claimed.

The invention is described with reference to the figures of the annexed drawings, in which:

Fig. 1 is a front elevation of a planimeter provided with the improvement forming the subject matter of this invention.

Fig. 2 is an upper plan view of same.

Fig. 3 is a cross vertical section on line 4—4 of Figs. 1 and 2.

Fig. 4 is a cross vertical section on line 5—5 of Figs. 1 and 2.

In the drawings, 1 indicates the main body of the planimeter consisting of a polished steel bar having at one of its ends a stand in the shape of a spatula 2 of sharp slightly curved edge 2′ whose plane is coincident with that of the body 1 and the stand 2. The other end of the main body 1 terminates in an extension of vertical cylindrical form 3 having a vertical opening 4. In this opening is tightly received the reduced upper end 5′ of the stem of the needle 5 which has a dull tip and presents at the point where the tapering 5′ commences a rim 6 which act as a butt against the lower face of the extension 3. The cylindrical portion of the stem of needle 5, which is below the rim 6, extends through an opening 7 of a collar 8, which is secured in place and in which terminates a curved arm 9 which projects upwardly from a side of a ring 10 concentric with the tip of the needle 5 and which forms a supporting base for the planimeter, around the needle 5, so that the lower face of the ring 10 may come in level with the dull tip of the needle 5, the ring 10 being provided with three equidistant heels 11 in the circle of the ring 10. The axial line of collar 8 coincides with the vertical shaft of the ring 10 and the arm 9 lies in the vertical plane of the main body 1, the needle 5 and the spatula 2. In a preferred form of the invention the ring 10 presents at its upper inner edge a beveled cut 10′.

Such construction causes the needle 5 to have a certain stability on the plan of a drawing, afforded by the supporting base formed by the ring 10, this arrangement permitting the planimeter to stand on a plan by bearing three points which are not in a straight line and which is constituted by said ring 10 and the tangency or lower point in the lower sharp edge 2′ of spatula 2.

In order to determine with this planimeter the surface limited by a closed border drawn on a paper, for instance, the planimeter is placed in raised position on the plane of the paper so that the tip of needle 5 may come on the gravity center of the closed surface or approximately on same if such center is not known, and this point is then united by a straight line with any point whatever of the border. Then there is marked on the paper the position of the spatula 2, which can be any position, to effect which a slight pressure will be exerted on the planimeter, which produces on the paper a mark produced by the contact point of the sharp edge of the spatula 2 with the paper, and by taking the ring 10 with one hand and the spatula 2 with the other, the planimeter is moved on the paper causing the tip of the needle 5 to travel first on the straight line already drawn and then on all the border of the surface in one direction until reaching the start point on the same straight line. During this travel, the spatula has changed its position coming to a final place different or distant from the one previously occupied and this second place is marked on the paper by means of a slight pressure on the planimeter, as before. The distance traveled by the spatula, that is, the distance between the initial and final positions of the lower point of the spatula, multiplied by the distance between the tip of the needle 5 and the lower point of the spatula (which is the constant of the instrument) will give the area of the surface limited by the closed border.

Once this first operation is finished, the planimeter is rotated on the tip of the needle 5 an angle of 180° and the same op-

eration as previously explained is repeated to obtain another figure of the area of the surface. The arithmetical half or average of the two figures gives the actual value of the sought area. In order to assure the accuracy of the result, the operation can be repeated various times and the average is taken as an accurate value.

It should be understood that the details of construction of the instrument and its form can be widely varied without departing from the essence or spirit of the invention, which is as pointed out in the appended claims.

What I claim is:—

1. A planimeter comprising a needle, a horizontal ring around the same, provided with three lower equidistant heels for bearing on a plane, the said ring being concentric with the tip of the needle and being provided with a curved raised arm arranged on the longitudinal vertical plane of the planimeter and terminated in a collar which fits on the stem of the needle.

2. A planimeter comprising a bar, a stand of spatula shape at one end thereof, a needle at the opposite end, a supporting base around the needle consisting of a horizontal ring concentric with the tip of the needle and provided with a curved raised arm having a bearing for the stem of the needle, so that the sharp edge of the spatula, the tip of the needle, and the arm holding the supporting base are arranged in the same vertical plane, the said bar having an opening in the end opposite that provided with the spatula shaped stand and the stem of the needle having a reduced upper end fitted in said opening, said needle having a flange which bears on said bearing and also having a point at its lower end.

In witness whereof I affix my signature.

LUIS LARRAZABAL y FERNANDEZ.