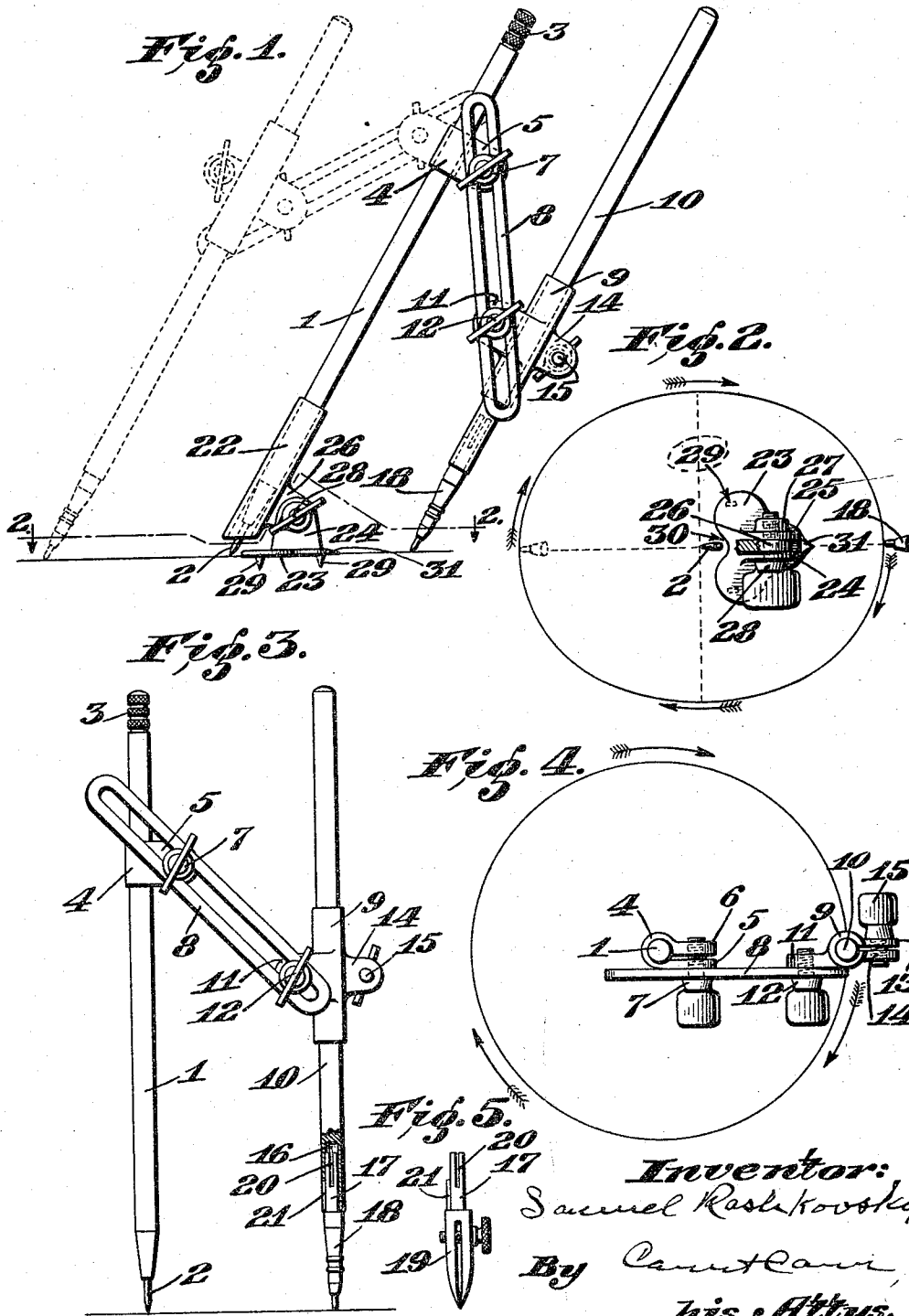


1,286,770.

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UNITED STATES PATENT OFFICE.

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DRAFTING INSTRUMENT.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL RASHKOVSKY, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Drafting Instruments, of which the following is a specification.

This invention relates to drafting instruments, and more particularly to an instrument for describing or generating a regular curved line, either circularly, elliptically, parabolically or hyperbolically; or, in other words, an instrument capable of adjustment and use similar to ordinary compasses, to describe true circles of various diameters; as an ellipsograph, to describe cylindrical and conic sections, such as ellipses of different major and minor diameters; and as a generator of a parabola or hyperbola. Generally stated, the invention resides in an instrument revoluble, either cylindrically or conically, about a fixed axis, and comprising an axis-bar or leg and a generating or scribing bar or leg having a pivotally and extensibly adjustable connection, said generating or scribing bar or leg being capable of movement longitudinally and rotatably with respect to its axis, or set in fixed relation to said axis-bar, at will, and a tilt-able supporting member or device in which said axis-bar or leg may be mounted with longitudinal and rotative movement with respect to its axis.

The invention has for its principal objects to produce, in an instrument of the said character, a simple and efficient structure which is readily adjusted for the purposes intended and is easily manipulated. Other objects and advantages to be attained will hereinafter more fully appear.

In the accompanying drawings, illustrating a practical adaptation of the invention, and forming a part of this specification,—

Figure 1 is a view, in side elevation, illustrating an adjustment and use of the instrument in describing an ellipse;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a view, in side elevation, illustrating

an adjustment and use of the instrument as compasses in describing a circle;

Fig. 4 is a plan view of the instrument as shown in Fig. 3;

Fig. 5 is a detail view of an inking device or pan to be used interchangeably with the pencil-holder shown in Figs. 1 and 3.

Referring now to the drawings, the instrument, as therein shown, comprises an axis-bar or leg 1 which is provided with an ordinary needle-point 2 at one end, and has its opposite end portion knurled, as at 3, or otherwise suitably formed or provided with convenient manipulating means.

On the bar 1 is a member 4 which is adjustable lengthwise thereof in some suitable manner. As shown, this member 4 comprises a split sleeve (see Fig. 4), said sleeve having ears or lugs 5, 6, which are apertured, the one, 6, being screw-threaded, so as to receive a clamping screw 7.

The clamping screw 7 is inserted through a slotted connecting and adjusting bar 8 and serves the dual purpose of fastening the said bar 8 to the member 4, as well as securing the said member 4 in its adjusted position on the axis-bar 1.

The connecting and adjusting bar 8 has an adjustable engagement with a supporting and guiding member 9 for a generating or scribing bar or leg 10. As shown, this member 9 comprises a sleeve having an ear or lug 11 which is apertured and screw-threaded to accommodate a clamping screw 12 (see Fig. 4), said clamping screw 12 being inserted through the slot in the bar 8 in a manner similar to the first-mentioned screw 7. This sleeve 9 is also split and provided with ears or lugs 13, 14, which are apertured, the one, 14, being screw-threaded, for the reception of a clamping screw 15, whereby the sleeve may be either tightened on the said bar 10, or loosened so that the bar may slide freely therethrough, as the case may be, depending as to whether the instrument is used as compasses or as an ellipsograph or a generator of a parabola or hyperbola, as will be later herein set forth.

As shown, the lower end portion of the generating or scribing bar or leg 10 may have an axial recess or socket 16 for the reception of the shank portion 17 of a pencil-holder 18 or an inking pen 19, interchangeably, the former being shown more clearly in Fig. 3, and the latter in Fig. 5. These two last-mentioned devices may be of any desirable construction and arrangement, but they are conventionally shown, for practical purposes, as having their shanks bifurcated, as at 20, so as to fit the socket 16 snugly with spring effect; and said shanks are further provided with splines or keys 21, which fit in a slot provided therefor in the bar 10, so as to prevent the shank from turning in the socket.

The application of the instrument as compasses will be first described and the same is illustrated in Figs. 3 and 4 of the drawings. In this use, the axis-bar 1 and scribing bar 10 may be set either in parallel relation, as shown, or in angular relation, as desired; and, in such relation, they are rigidly connected, through the bar 8 and the members 4 and 9, by tightening the clamping screws 7, 12 and 15.

Obviously, by swinging the instrument around on the axis-bar or leg 1, the scribing bar or leg 10 describes or generates a circle on a plane surface, just the same as if ordinary compasses were used.

In its use as compasses, the instrument is capable of extensive adjustment, in that the members 4 and 9 are shiftable on the bars 1 and 10, and the connecting bar 8 is also adjustable, both lengthwise and pivotally, on said members 4 and 9. Hence, the range of adjustment is from very small circles, such as are described by the ordinary two-legged compasses, to exceedingly large circles which ordinarily require the use of beam compasses or the like.

The use of the instrument as an ellipso-graph or in generating a parabola or hyperbola will now be described. In this use, the instrument is revolved while the axis-bar 1 is held with its axis fixed in an inclined or tilted relation to the plane of the section or surface to be inscribed or marked, and the clamping screw 15 is loosened so that the generating or scribing bar 10 will slide easily through the sleeve 9.

The axis-bar 1 and the generating bar 10 may be set parallel with each other or in angular relation so as to describe either a cylinder or a cone in revolution.

If the two bars 1 and 10 are parallel, or if at an angle to each other, and the angle is less than the angle at which the bar 1 is set with respect to the plane of the section or surface to be inscribed or marked, the line generated will be elliptical and continuous, as the marking or scribing point of the

bar 10 never leaves the surface or plane, it being understood, of course, that the bar 10 is free to slide through the sleeve 9. Hence, the outline will be an ellipse and a section of a cylinder or a cone, as the case may be.

If the angle of the two bars 1 and 10 is equal to the angle of the bar 1 with respect to the plane of section or surface to be inscribed or marked, the generating or scribing bar 10 will leave the surface at diametrically opposite points and describe a parabola as long as it remains in contact with the surface. Likewise, if the angle is greater, the instrument will describe a hyperbola.

To hold the axis-bar 1 in tilted or angular relation to the surface to be inscribed, it is placed rotatably and longitudinally movable in a supporting tube or sleeve 22 which has a pivotal adjustment on a base 23.

As shown, the base 23 comprises a flat, trifoliate plate having a pair of upstanding, parallel ears or lugs 24, 25, thereon, between which an ear or lug 26 on the sleeve 22 extends. The respective ears or lugs 24, 25 and 26, have axially aligned apertures, and the ear or lug 25 has a boss or protuberance 27 surrounding its aperture which is screw-threaded, so as to accommodate a clamping screw 28, whereby the sleeve 22 may be fastened in whatever tilted position it may be set with respect to the base 23. The base may also be provided on its under side with two or more prongs or teeth 29 to be pressed into a drawing-board, through the paper or other material thereon to be inscribed, or into any surface on which the instrument may be used; and it is also preferable to provide a medial recess or reentrant portion in the base-plate to make clearance for the needle-point 2 of the axis-bar 1 (see Fig. 2). The base-plate may be further provided with a medial pointed projection 31 or other suitable indication or mark to coincide with the axial line of the ellipse or section to be described when the needle-point 2 is made to touch the same line, so as to facilitate the proper positioning of the instrument.

To use the instrument in the easiest and simplest way, in describing an ellipse, the axis-bar 1 and the generating bar 10 are first adjusted in spaced parallel relation according to the minor diameter or axis of the ellipse; that is, so that the perpendicular distance between the needle-point 2 and scribing or marking point of the bar 10 is equal to one-half the diameter. Then the axis-bar 1, in the sleeve 22, with the generating bar 10 in line therewith, is tilted until the distance between the needle-point 2 and scribing or marking point of the bar 10 is equal to one-half the major diameter of the ellipse along the plane of the section or surface to

be inscribed, said bar 1 being freely slidable in the sleeve 22 and the bar 10 likewise slidable in the sleeve 9, as hereinbefore pointed out. In this instance the needle-point 2 coincides with the intersection of the two axes or center of the ellipse, and the instrument describes a cylinder in revolution. Consequently, the instrument being in tilted position with respect to the surface being inscribed, the outline is that of an elliptical section of a cylinder.

The instrument being positioned along the major axis of the ellipse, as shown in Figs. 1 and 2 of the drawings, the outline may be easily generated by steadying the sleeve and its base 23 with one hand, and, with the other hand manipulating the generating or scribing bar 10 and exercising care to keep the marking point of the bar 10 in contact with the surface being inscribed while rotating the instrument about the axis of the inclined bar 1.

In the same way it is possible to generate an ellipse with the two bars or legs 1 and 10 in angular relation to each other. In such an instance the instrument will describe, in revolution, either a cone with apex upward or an inverted cone, depending whether they diverge or converge toward the surface being inscribed. That is, if the angle between the two bars is less than the angle between the bar 1 and the surface being inscribed when divergent. If convergent, the relative angularity of the two bars with respect to the angularity of the bar 1 and surface being inscribed, matters not, as the scribing point can be made to touch said surface throughout the entire revolution of the instrument. Hence, an ellipse will be described.

If the angle between the two bars 1 and 10 is equal to the angle between the bar 1 and the surface being inscribed, the outline described will be a parabola, as the scribing point will leave the surface at a point on either side of the bar 1. Likewise, if the angle between the two bars 1 and 10 is greater than the angle between the bar 1 and the surface being inscribed, the scribing point will leave the surface, but the line described will be a hyperbola.

To adjust the instrument in describing a conic section, a more complex mathematical calculation is required than when setting it for a cylindrical section, but it is within the possibilities of the invention; and the adjustment may be facilitated by providing suitable graduations or indications on the two bars 1 and 10 and the connecting bar 8, with correlated markings on the sleeves 4 and 9. The details of such arrangements are not a part of the present application, and, therefore, are not herein set forth with particularity.

Obviously, the device admits of consider-

able modification and changes without departing from the spirit of the invention as defined by the appended claims. The invention, therefore, is not limited to the exact construction and arrangement shown.

What is claimed is:

1. In an instrument of the character described, an axis leg, a supporting member adjustable longitudinally on said leg, a second supporting member, a connecting bar having a longitudinally and pivotally adjustable engagement with said supporting members, a scribing leg slidable longitudinally and rotatably on said second mentioned supporting member, and means for fastening said scribing leg to its supporting member at will.

2. In an instrument of the character described, an axis leg, a supporting member adjustable longitudinally on said leg, a second supporting member, a connecting bar having a longitudinally and pivotally adjustable engagement with said supporting members, a scribing leg slidable longitudinally and rotatably on said second mentioned supporting member, means for fastening said scribing leg to its supporting member at will, and a separable supporting and positioning device having a tiltable member through which the resting end portion of said axis leg extends and is capable of longitudinal and rotative movement therein.

3. A unitary scribing device comprising an axis leg having an axially pointed resting end, a generating leg having a scribing point, a sleeve slidable on said axis leg, a sleeve slidable on said generating leg, a connecting bar having a longitudinally and pivotally adjustable engagement with said sleeves, means for fastening said axis leg, sleeves, and connecting bar in relative adjusted position, and means for fastening said generating legs to its sleeve at will, and a separate unitary supporting and positioning device comprising a base, and a sleeve adjustable tiltably thereon and through which the resting end portion of said axis leg is capable of longitudinal and rotative movement and is supported with its resting point on the surface to be inscribed.

4. In an instrument of the character described, an axis-bar or leg, a generating bar or leg, a supporting member adjustable longitudinally on said axis-bar or leg, a supporting member slidable rotatively and longitudinally on said generating bar or leg, a connecting bar having a longitudinally and pivotally adjustable engagement with said two mentioned supporting members, and means for fastening said axis bar or leg, generating bar or leg, connecting bar, and supporting members either in absolutely fixed relation, or said axis-bar or leg and said connecting bar in fixed relation to the

respective supporting members only, while said generating bar or leg is permitted rotative and longitudinal movement on said second-mentioned supporting member.

5 5. In an instrument of the character described, an axis-bar or leg, a generating bar or leg, a longitudinally slotted connecting bar, a split sleeve on said axis-bar or leg, a clamping screw for fastening said sleeve to

said axis-bar or leg and said connecting bar, 10
a split sleeve on said generating bar or leg, a clamping screw for fastening said sleeve to said connecting bar, and a clamping screw for fastening the sleeve to said generating bar or leg. 15

Signed at St. Louis, Missouri, this 25th day of February, 1918.

SAMUEL RASHKOVSKY.

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