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CURVE DESCRIBING INSTRUMENT

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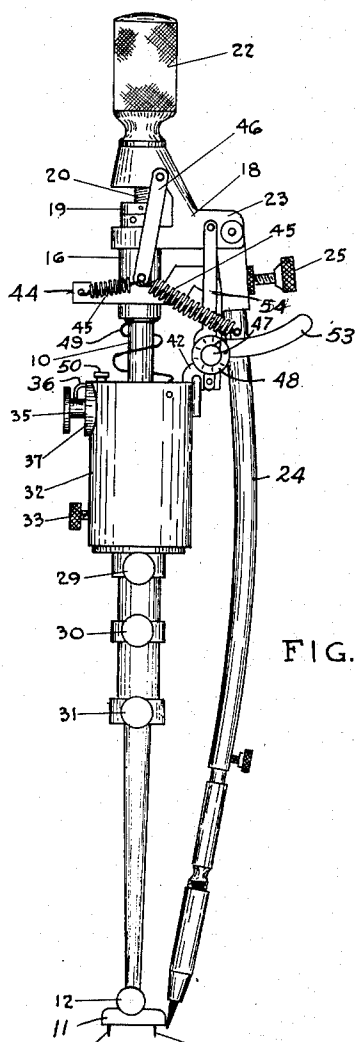


FIG. 1

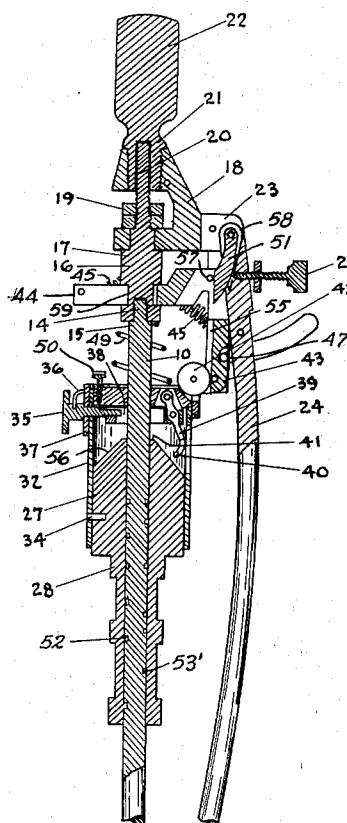


FIG. 2

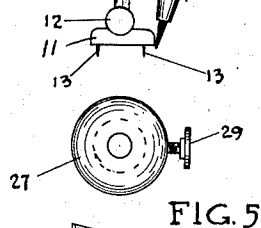


FIG. 3

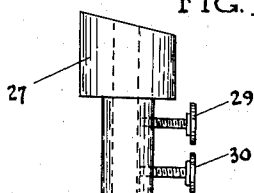


FIG. 4

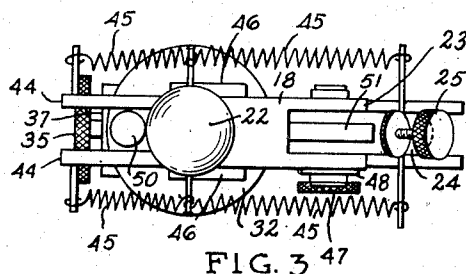


FIG. 5

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## UNITED STATES PATENT OFFICE

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## CURVE DESCRIBING INSTRUMENT

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2 Claims. (Cl. 33—27)

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The invention relates to improvements in drawing instruments as described in the present specification and illustrated in the accompanying drawings that form a part of the same.

The invention consists essentially of the novel features of construction as pointed out broadly and specifically in the claims for novelty following a description containing an explanation in detail of acceptable forms of the invention.

The objects of the invention are to devise an instrument which will facilitate all types of engineering drafting, due to the fact that it may be manipulated to accurately draw predetermined sizes of ellipses, parabolas, hyperbolas, cycloids, right and left spirals, ship's curves, log curves, and other type of curvatures utilizing pen, pencil or other marker; to speed up the work of draftsmen and others and reduce errors to the minimum, through eliminating manual calculations by the engineer in the compass portion of his work in drafting; to construct an instrument that will be quickly and easily understood by the draftsman, engineer, student and others and simple to operate and compact in form; and generally to provide a drawing instrument that will be accurate in its calculation, and efficient for its many uses.

In the drawings:

Figure 1 is a side elevation of the drawing instrument.

Figure 2 is a fragmentary sectional view of the drawing instrument.

Figure 3 is a fragmentary plan view of the instrument.

Figure 4 is an enlarged detail of one of the many cams applicable to the instrument.

Figure 5 is a plan view of the cam as illustrated in Figure 4.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawings, the drawing instrument as illustrated and hereinafter described is in the form of a two legged type of instrument, but it will of course be understood that the main features of this invention may be introduced in other types of drawing instruments without in any way departing from the essential features of this invention, in devising an instrument which may be adjusted accurately to the predetermined degrees and automatically draw the predetermined configuration, simply by the operator manually turning or otherwise operating the instrument.

The instrument consists of the centering leg as indicated by the numeral 10 having at its lower end the centering member 11, secured thereto by the fastening member 12 and provided with a plurality of prongs 13. The centering leg 10 has at its upper end the threaded neck 14 provided with the shoulders 15 which support the

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finger grip shaft 16, the latter having a threaded opening engaging neck portion 14 of the centering leg. This finger grip shaft 16, which may be termed an axle, has the shoulders 17 on which the rotatable bracket 18 is mounted, the rotatable bracket being held in position by the lock nuts 19, which in turn are threaded on part of reduced end portion 20 of the finger grip shaft 16. The rotatable bracket 18 has a finger grip 22 mounted on its upper end and this finger grip in turn has an orifice in its underside in which is rotatably mounted the upper portion of the finger grip shaft 16. This finger grip 22 is knurled and serves as a means for rotating the drawing instrument. The rotatable bracket 18 has the protruding lugs 23 which form a journal for the marker leg 24; the latter may be adjusted with respect to diameter or size by means of the thumb screw 25 of which the inner end contacts curved face of pawl 51, the straight face of the latter contacting shaft 57 which is secured to sliding member 43. The slot 58 in the upper end of the marker leg 24 allows movement of the pawl 51. The horizontal fingers of guide member 44 slide in groove 59 of the finger grip shaft 16. The lower portion of guide member 44, that portion parallel to center line of instrument, forms finger supports for the lever slide 43, as well as curved supports 53 for marker leg 24. The tapered adjustment screw 47 fits in a tapered groove in the lever slide 43, the latter also having in its underside a longitudinal groove 55 which guides wheel 42. Rods 54 support outer end and vertical fingers of guide member 44. This guide member and marker leg 24 and their component members are provided with tension springs 45 to hold said members yieldingly together; springs 45 are secured to horizontal fingers of 44 by pins as well as to 24 in a like manner, they are also attached to and suspended by equalizer rods 46. The marker guide 27 is slidably enclosed by cylindrical casing 32 having an aperture through which pin 33 extends for engagement with aperture 34 of marker guide. The marker guide 27 is provided with a cam face 56 suitably shaped to cause the marker leg to make the requisite configuration, by forcing the casing 32 to rise or fall under tension of the spiral spring 49, thereby forcing the marker leg 24 outwards or inwards respectively by the action of the wheel 42 on the lever slide 43. An adjustment screw 35 extends through an orifice in casing 32 and is provided with pointer or indicator 36 for measuring off specific degrees from the graduated circular face 37 which is secured to casing 32. The adjustment screw 35 is held in place by a set screw 53 which fits in a circular groove in 35, and the inner portion of 35 is specially threaded to fit specially threaded orifice in yoke member 38 which is in turn secured by a shaft to the arm

39, the latter being secured by a second shaft in a slot in the top of the casing 32. 40 indicates a roller or other rounded face attached to the arm which rotates around leg 10 and is in contact with cam face 56 of marker guide 27. In this way the roller 40 may be adjusted and placed where desired on face 56 by the lateral movement of the yoke 38 in accordance with selected degree as indicated by 36 on 37, to make the necessary configuration. The adjustment screw 47 with indicator is set on a graduated disk 42 to correspond with the setting of the pointer 36, on the face 37. When adjustment screw 47 is turned clockwise one unit the lever slide 43 moves inward one unit or degree also one unit turned on 35 causes wheel 40 to move one unit. These adjustments are for 0 to 90 degree ellipses, etc. When the screw 35 is turned and the pointer 36 points to 0, the roller 40 will be on contact face 41 at upper extremity of cam face 56 of marker guide 27 and thus when 22 is rotated marker leg 24 will describe a circle, since there will be no change in level in the arm 33 and the casing 32. The diameter is set by thumb screw 25. The helical tension spring 49 encircles centering leg 10 and yieldingly holds cylindrical casing 32 and its component members or parts namely 43, against cam face 56 of marker guide 27. Screws 29, 30 and 31 must be screwed firmly against leg 10, and pin 33 must be removed from orifice 34 when drawing configurations that join such as ellipses thus holding 27 stationary while allowing 32 to revolve. In Figure 2, 52 indicates a right hand helical groove and 53' a left hand helical groove, 29 and 30 are threaded thumb screws with a reduced rounded end portion to fit the helical grooves in leg 10 thus when 32 is held firmly to 27 by pin 33 in 34, and 22 turned right or left with 47 set to desired degree of pitch, marker leg 24 will describe a desired spiral. In other words all members enclosed by casing 32 and also those attached will move upward or downward and wheel 42 moving in groove 55 will force leg 10 inward or outward. Grooves 52 and 53' in leg 10 can be made in any manner to attain desired configuration. This completes the general construction of this instrument and through manipulating the thumb screws and adjustment screws and changing or replacing the marker guide 27 or leg 10 and/or other guide members many curved configurations can be made accurately without the need of any instruments. Such configurations will be on an accurately pre-arranged scale.

In order to more readily understand the instrument various applications of the device are described in making different configurations, but needless to say other applications may be made without departing from the essential features of this invention.

If an ordinary circle is wanted, place centering member 11 at center of desired work, set 24 to desired radius by 25, then if pin 33 is out and 29 tight, set 36 at zero on 37: use as ordinary compass. If 33 is in orifice 34, set 29, 30 or 31 in horizontal grooves on leg 10, then use as an ordinary compass. Circles can be described with any combination of set ups.

When it is required to describe an ellipse, the thumb screws 29 and 30 are tightened to secure the marker guide 27 to leg 10, the major or minor axis is then set by adjusting the screw 25. Turn 35 so that 36 indicates proper degree, then set

the same on 48 by turning 47. 47 causes 43 to move to desired degree; the instrument is then used as an ordinary compass. The instrument is set in like manner for describing parabolas, cycloids etc., but remembering that 27 must be changed to suit the desired configuration.

This instrument will also describe, with special attachments, epicycloids, hypocycloids, an involute of a circle, and any other special or irregular figure made up of curves.

What I claim is:

1. In drawing instruments, a centering member having helical grooves of predetermined pitch, a cam mechanism encircling said centering member, a casing enclosing the upper portion of said cam mechanism, adjustment means adapted to connect said cam mechanism to the helical grooves of said centering member, a detachable member adapted to secure said casing to said cam mechanism, a rotatable bracket mounted on said centering member, a finger grip integrally attached to said rotatable bracket, a marking member pivoted to said rotatable bracket, a guiding arm and roller mechanism secured to said casing and engaging the cam face of said cam mechanism to move said casing up and down in accordance with the shape of said cam face, adjustable means between the casing and said marking member for producing pivotal motion of said marking member in accordance with the up and down motion of said casing, and means for adjusting the said guiding arm and roller mechanism according to predetermined data for drawing a predetermined curve.

2. In drawing instruments, a centering member having helical grooves of predetermined pitch, a cam assembly encircling said centering member, a casing enclosing the upper portion of said cam assembly, adjustment means adapted to connect said cam assembly to the helical grooves of said centering member, a detachable member adapted to secure said casing to said cam assembly, a rotatable bracket mounted on the upper extremity of said centering member, a finger grip integrally attached to said rotatable bracket, a marking member pivoted to said rotatable bracket, a guiding arm and roller pivotally attached in the top portion of said casing and contacting the cam face of said cam assembly and adapted to motivate the casing in variation in level relative to the said cam assembly, means for adjusting the position of the said guiding arm and roller relative to the centering member according to predetermined data for drawing a predetermined curve, and adjustable means between the said casing and the said marking member for producing pivotal movement of said marking member in accordance with the up and down motion of said casing.

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