

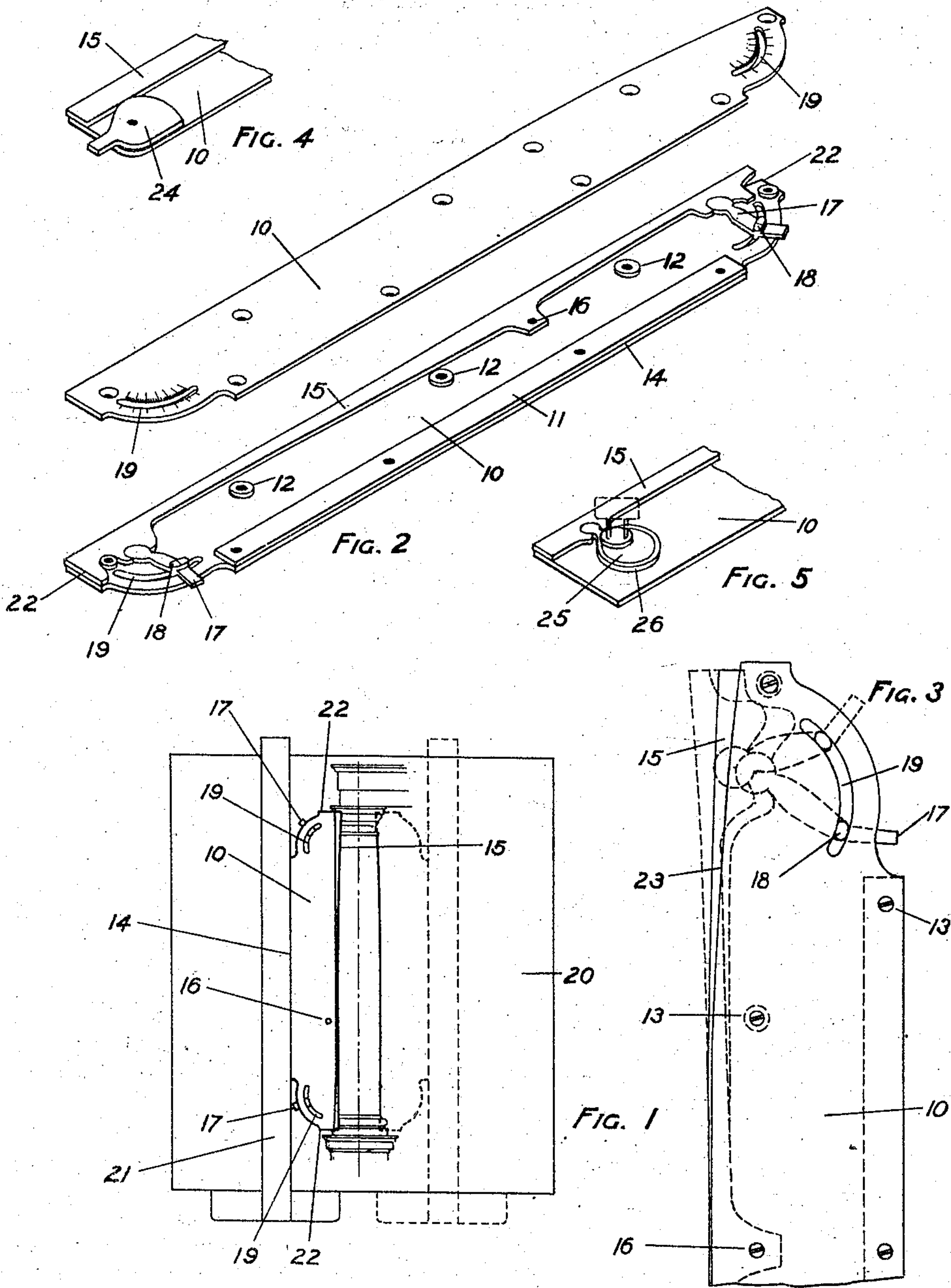
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E. J. LORING.
INSTRUMENT FOR DRAWING CURVES.

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NO MODEL.



WITNESSES
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UNITED STATES PATENT OFFICE.

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INSTRUMENT FOR DRAWING CURVES.

SPECIFICATION forming part of Letters Patent No. 772,622, dated October 18, 1904.

Application filed February 8, 1904. Serial No. 192,515. (No model.)

To all whom it may concern:

Be it known that I, ERNEST J. LORING, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain
5 new and useful Improvements in Instruments for Drawing Curves, of which the following is a specification.

This invention has for its object to provide
10 an instrument adapted for a drafting instrument to generate or test tangential curves, &c., or adapted for use as a testing or working templet for any constructional or mechanical work requiring the generation or trans-
ference of relatively flat curves.

15 To this end it embodies a resilient ruling guide or edge of adjustable curvature which has a characteristic or predetermined law of curvature and is mounted and adjusted in a novel manner, as will be hereinafter more
20 fully explained.

Of the accompanying drawings, Figure 1 represents a plan view of a drafting-board and T-square and an instrument embodying
25 my invention. Fig. 2 represents a perspective view of the instrument, showing the top plate separated from the rest of the instrument. Fig. 3 represents an enlarged plan view of one end of the instrument. Figs. 4
30 and 5 represent detail perspective views illustrating two modified forms of mechanism for adjusting the ruling-guide.

The same reference characters indicate the same parts in all the figures.

The instrument comprises a frame com-
35 posed of parallel flat side plates 10 10, separated by a thin back strip 11 and shallow posts 12 12 and connected by screws 13, whose heads are flush with or below the plate-sur-
face. The back edge 14 of the instrument is
40 a straight edge, and the front edge is a ruling-guide 15, of adjustable curvature, fixed in its intermediate portion at 16 at a point about
one-third of the distance from one end of the instrument and having free end portions or
45 extremities, one of which is thus made about twice the length of the other. These extremi-
ties are engaged by pivoted levers 17 in the form of the invention shown in Figs. 1, 2,

and 3, having projections 18 occupying
curved cam-slots 19 in the frame-plates, the
50 pivots of the levers being eccentric to the slots, so that swinging the levers to carry the
projections 18 along the slots shifts the ex-
tremities of the ruling-guide 15 in one direc-
tion or the other. These levers work with a
55 mechanical advantage on the extremity of the ruling-guide—that is, their relation to said
extremities and to the cam-slots 19 is such
that their throw is greater in extent than the
resulting throw imparted to the extremities
60 of the guide at the points where the levers engage these extremities. The edges of the
slots 19 may be graduated, as shown in Fig. 2, and the ends of the projections 18 index-
marked, whereby different predetermined ad-
65 justments may be effected.

The ruling-guide 15 is flexible and resilient
between its fixed portion 16 and its two free
extremities, so that according to the degree
of pressure exerted by the levers 17 in their
70 different positions the extremities or end por-
tions of said ruling-guide will assume differ-
ent degrees of curvature. The curvature of
each end varies according to a characteristic
or predetermined law—that is to say, the
75 ruling-guide is so regulated in dimensions
and material between its fixed point and free
extremities as to invariably assume the same
curvature for any given position of either
extremity. The rate of curvature of the par-
80 ticular curve for which the instrument may
be arranged can be expressed as a continu-
ous or progressive function of the length of
arc, and the instrument will generate such a
curve with closest accuracy. It may also be
85 used to transfer any curve from work to draw-
ing if said curve is of the same characteris-
tic of curvature as that for which the par-
ticular instrument is fitted.

It is obvious that by properly constructing
90 the instrument its working edge will bend to
a curve which may be of uniform curvature
or one whose curvature either increases or
decreases from the tangential point, this in-
crease or decrease progressing at any prede-
95 termined rate.

The manner of using the instrument is illustrated in Fig. 1, in which 20 is a drafting-board, and 21 a T-square. The back edge 14 of the instrument is placed against the edge 5 of the T-square, as shown, and the opposite ruling edge employed to plot the desired curves on the drawing-surface, the ruling edge, as will be evident, being continuous and forming the outermost edge of the instrument, so that continuous curves may be drawn.

Preferably the ends 22 of the frame are at right angles with the back edge 14 and the projecting handle portions of levers 17 arranged entirely within the rectangular limits of said back and end edges, so that the instrument may be used in any position in coöperation with T-squares, triangles, straight-edges, &c. By making one of the two independently-adjustable portions of the ruling-guide longer than the other the ends are differentiated and the instrument adapted to a large variety of curved forms. Opposite the fixed point 16 the ruling edge of the guide 15 is always parallel to the straight rear edge 14 and perpendicular to the end edges 22. Hence the instrument is readily placed to its work. It is one of the features of the instrument that there are no projections beyond the planes of the parallel flat surfaces of the frame, thus making the instrument perfectly reversible.

It will be seen, particularly in Fig. 3, that the front edge of the frame at the shorter end recedes from the straight line of the rest of the edge, as shown at 23, beginning in the vicinity of the fixed point 16. The shorter end portion of the ruling-guide 15 is adapted to take either a convex line, as shown in full lines in said figure, or a concave line, as shown in dotted lines, or a straight line between the two. It is obvious that this might also apply to the longer portion of the ruling edge, although not so shown.

The construction of the instrument renders it compact, and the location of the centers of gravity of the several parts all in the same plane conduces to strength and tends to prevent twisting of the instrument.

Various types of operating mechanism may be employed. Fig. 4 shows a modification in which a pivoted cam plate or lever 24 engages the ruling-guide 15. In Fig. 5 an eccentric 25, journaled in the frame-plates 10, has a strap 26, whose head rocks in a socket in the ruling-guide, whereby motion is imparted in both directions, as in Figs. 1, 2, and 3.

Various other modifications may be made without departing from the spirit of the invention.

The instrument may be made in various sizes, depending somewhat upon the character of the work. For instance, the larger sizes may be used for fairing ships' curves, &c. Also, for example, while Fig. 1 shows the instrument on a drawing-board adjusted

for drawing the entasis of a column a similar instrument of greater size may be used as a templet in the production of the column itself.

I claim—

1. A drafting instrument comprising a frame having a straight back edge, a ruling-guide of variable curvature having a point fixed with respect to the said back edge and tangent to a line parallel with the back edge, said guide having a free working edge continuous across said point of tangency and a shiftable extremity, and means for shifting said extremity in a direction transverse to said back edge.

2. A drafting instrument comprising a frame having a straight back edge, a ruling-guide of variable curvature having a point fixed with respect to the said back edge and tangent to a line parallel with the latter, said guide having a free working edge continuous across said point of tangency and shiftable extremities on both sides of said point, and means for shifting said extremities in a direction transverse to said back edge.

3. A drafting instrument comprising a frame having a straight back edge, a resilient ruling-guide having a fixed point of attachment to said frame and a shiftable extremity, said guide being free between said fixed point and extremity and so constructed as to assume predetermined curvatures varying according to the degree of pressure exerted on said extremity, and means interposed between the frame and said extremity for shifting said extremity transversely of said back edge to impart varying flexure to the guide.

4. A drafting instrument comprising a frame, a resilient ruling-guide having a fixed point of attachment thereto and a shiftable extremity, and a pivotally-movable adjusting-lever interposed between said frame and extremity and so arranged as to act with mechanical advantage on said extremity.

5. A drafting instrument comprising a ruling-guide having a continuous ruling edge provided with independently-shiftable end portions possessing characteristic laws of curvature, means for holding said ruling edge immovable at a point intermediate of its ends, and means to independently adjust the end portions of said ruling edge to different degrees.

6. A drafting instrument comprising a frame, a ruling-guide having a point fixed on said frame and a shiftable extremity and possessing a characteristic law of curvature, and means acting on said extremity to adjust said guide to convex and concave curves or a straight line.

7. A drafting instrument comprising a frame, a ruling-guide having a fixed point of attachment thereto and shiftable end portions of different lengths and characteristic laws of curvature on opposite sides of said fixed point, and means interposed between said frame and

end portions to adjust said end portions to varying curvatures.

5 8. A drafting instrument comprising a frame having a straight back edge and supporting-face for resting on a drawing-surface, and a continuous ruling-guide supported within said frame and protruding therefrom to form the outermost edge of the instrument, said ruling-guide being adjustable edgewise.

10 9. A drafting instrument comprising a frame having a straight back edge, and a continuous ruling-guide fixedly secured to said frame at a predetermined point from said back edge, and means for independently adjusting the curvature of the end portions of said guide.

15 10. A drafting instrument comprising a frame composed of side plates separated by a space, a ruling-guide of adjustable curvature filling said space and having one edge protruding beyond said plates, and means for varying the curvature of said guide.

11. A drafting instrument comprising parallel flat frame-plates, an adjustable ruling-guide mounted between said plates, and means mounted between the plates to adjust the curvature of said guide, the planes of the two sides of the instrument being formed by the outer surfaces of the plates and being free from outward projections.

12. A drafting instrument comprising a frame having straight back and end edges in rectangular relation, a ruling-guide of adjustable curvature carried by said frame, and adjusting means for said guide arranged entirely within the rectangular limits of said back and end edges.

In testimony whereof I have affixed my signature in presence of two witnesses.

ERNEST J. LORING.

Witnesses:

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