

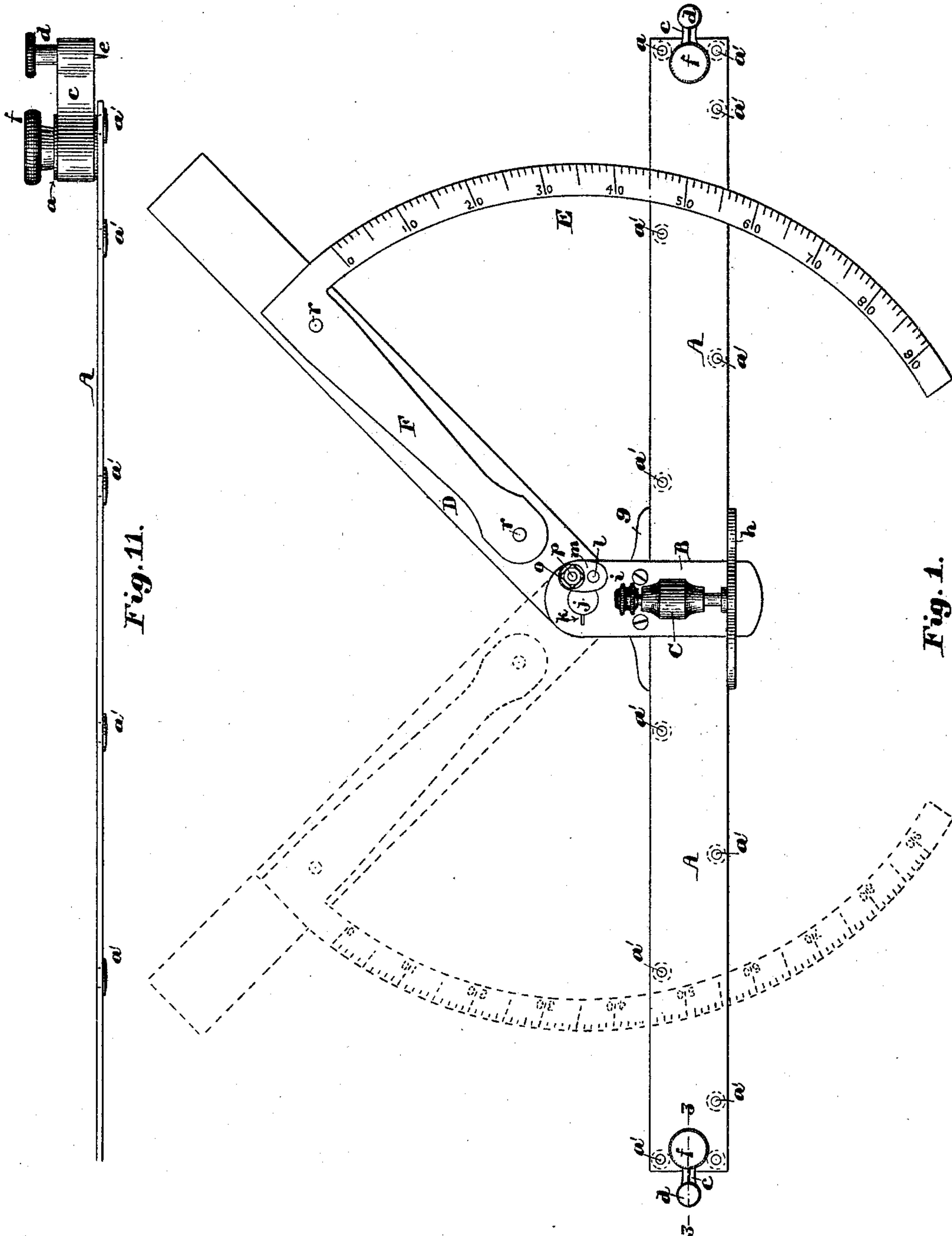
(No Model.)

2 Sheets—Sheet 1.

B. E. SAWYER.
PLOTTER.

No. 467,664.

Patented Jan. 26, 1892.



Witnesses:

Walter E. Lombard
J. Clifford Entwistle

Inventor:

Burnside E. Sawyer,
by *N. G. Lombard*
Attorney.

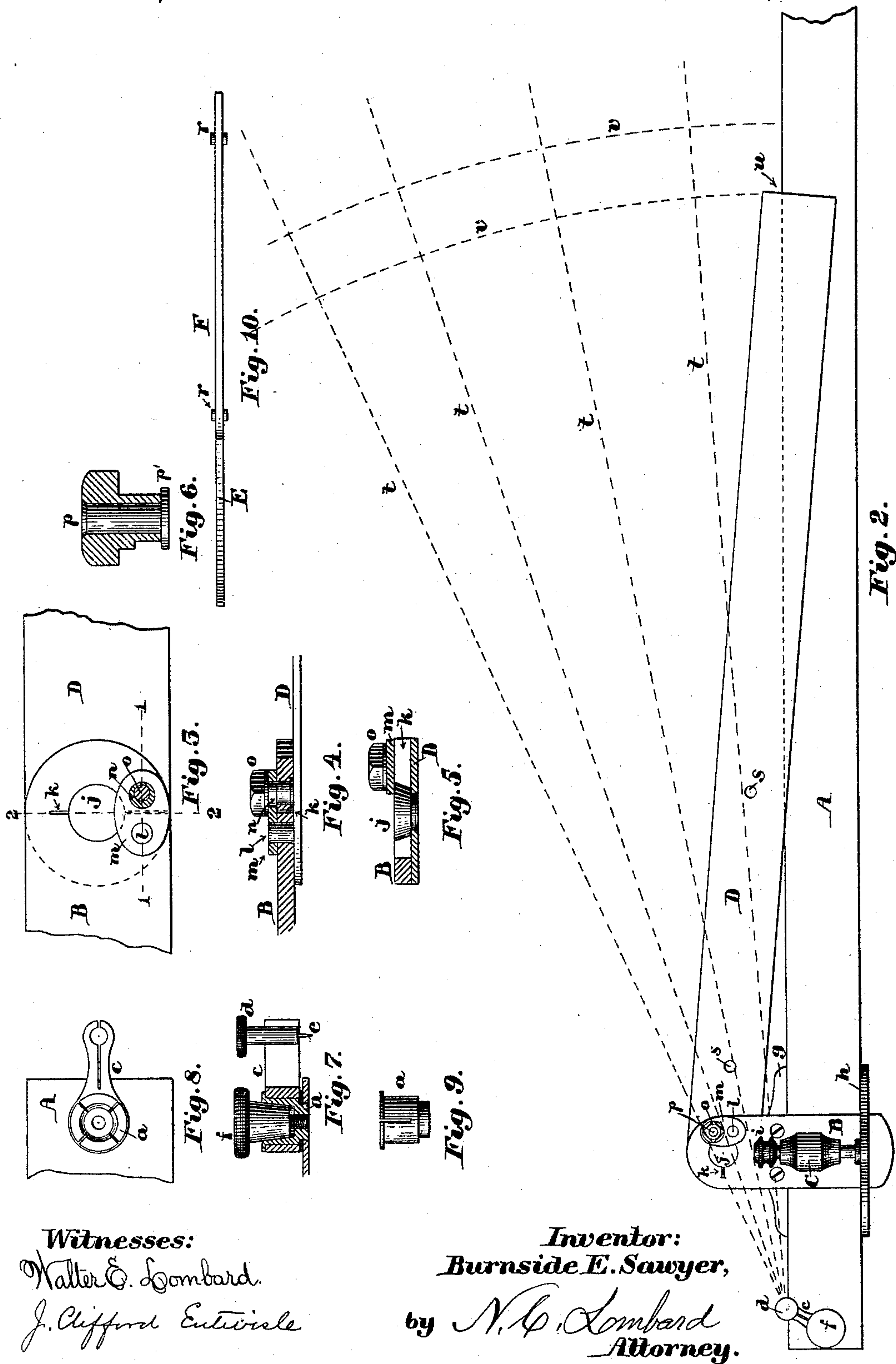
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UNITED STATES PATENT OFFICE.

BURNSIDE E. SAWYER, OF ATHOL, MASSACHUSETTS, ASSIGNOR TO LAROCY S. STARRETT, OF SAME PLACE.

PLOTTER.

SPECIFICATION forming part of Letters Patent No. 467,664, dated January 26, 1892.

Application filed September 1, 1891. Serial No. 404,440. (No model.)

To all whom it may concern:

Be it known that I, BURNSIDE E. SAWYER, of Athol, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Drawing-Instruments, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to that class of drawing-instruments which are used as guides in drawing straight and parallel lines and also radial lines, and is in part an improvement upon the invention described in the Letters Patent No. 436,842, granted to me September 23, 1890; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the accompanying drawings, forming a part of this specification, and to the claims hereinafter given and in which my invention is clearly pointed out.

Figure 1 of the drawings is a plan of my improved drawing-instrument complete. Fig. 2 is a partial plan of the same, illustrating the manner of using it for drawing radial lines and arcs of circles. Fig. 3 is a partial plan illustrating the construction of the pivotal connection of the bevel-tongue. Fig. 4 is a section on line 1 1 on Fig. 3. Fig. 5 is a section on line 2 2 on Fig. 3. Figs. 3, 4, and 5 are drawn to an enlarged scale. Fig. 6 is a vertical section of the clamping-eccentric for holding the bevel-tongue in adjusted position drawn to a still larger scale. Fig. 7 is a vertical section on line 3 3 on Fig. 1. Fig. 8 is a plan of the parts shown in Fig. 7, except that the conical clamping-bolt and the pivotal needle-point are removed. Fig. 9 is an elevation of the slotted clamping-bushing detached. Fig. 10 is an edge view of the segmental protractor-arm; and Fig. 11 is an edge view of a portion of the straight-edge, showing the buttons or bosses on its under side. Figs. 7, 8, 9, and 11 are drawn to the same scale as Figs. 3, 4, and 5.

In the drawings, A is a straight-edge or ruler, which may be of any desired length, and has firmly secured in each end thereof a slotted tubular stud *a*, upon which is mounted, so as to be movable about its axis, the ra-

dial-arm *c*, having formed in its free end a socket to receive the vertically-adjustable pin *d*, having set in its lower end the needle-point *e*, said arm *c* being slotted vertically through said socket, so that the pin *d* is held in any desired position in said socket by the spring-pressure of the two sides of said arm.

The arm *c* may be secured in any desired position to which it may be adjusted about its axis of motion by means of the thumb-screw *f*, the shank or main body of which is made tapering in the form of an inverted frustum of a cone, and fits into a correspondingly-shaped bore in the tubular slotted stud *a*, as shown in Fig. 7.

The straight-edge A has attached to its under side a series of thin wafer-like bosses *a'*, arranged in two rows, one near each edge, and generally so that a boss near one edge is opposite the center of the space between two bosses near the opposite edge, as shown in Figs. 1 and 11.

B is a short thin plate, having secured to its under side the gage-plate *g*, with its straight-edge at right angles to the edges of said plate B, and has fitted thereon, so as to be movable endwise thereof, the plate *h*, said plate *h* being pressed toward the plate *g* by means of a spring inclosed in the hub C, the tension of which may be adjusted by the milled nut *i*, as shown in Figs. 1 and 2. These parts referred to in the last paragraph are constructed and arranged substantially as in my before-cited prior patent, except that the relative positions of the plates *g* and *h* are reversed and the milled nut *i* is on the inner instead of the outer end of its bolt.

D is the bevel-tongue, pivoted to one end of the plate B by means of the frusto-conical fulcrum-pin *j*, secured firmly in the tongue D, as shown in Fig. 5. The plate B is cut entirely through at one side of said pin *j* and partly through at the other side of said pin by the slot *k* and has pivoted thereto at one side of said slot the link *m*, the other end of which is fitted to and embraces the eccentric *n*, formed on the revoluble pin *o* set in said plate on the side of said slot *k* opposite to the pin *j*. The eccentric-pin *n o* has its upper end squared to receive a wrench, and is secured in the plate B by the pin *p*, having

a thin flat head p' , which is fitted to a counterbore in the under side of said plate, the shank of said pin p passing upward through the eccentric-pin $n o$ and secured therein by riveting its upper end, as shown enlarged in Fig. 6.

It is a segmental protractor-bar graduated upon both sides from one to ninety degrees and provided at one end with the arm F , in which are set two pins $r r$, which project equally from both sides of said arm and are fitted to enter the two holes $s s$, formed in the tongue D , as shown in Fig. 2. The protractor E is easily applied to or removed from the tongue D , and the tongue D and its plate B are as readily applied to or removed from the straight-edge or ruler A or the tongue of a T-square, to which it is equally as applicable as to the straight-edge or ruler.

The operation of my invention is as follows: If it is desired to rule a long straight line through two given points at any angle to or parallel to the edge of the drawing board or table upon which the paper to be drawn upon is placed, the protractor, tongue D , and plate B are removed from the straight-edge or ruler A . Said ruler is then placed with its upper or inner edge in close proximity to the two points through which the line is to be drawn. The needle-points are then depressed, so as to cause them to pierce the paper and enter the drawing-board, so as to serve as fulcrums, about which the straight-edge may be adjusted slightly to bring its edge into the desired accurate position for drawing the line when the thumb-screws f are so turned as to clamp the arms c firmly to ruler A , when the line may be drawn with perfect assurance that the ruler will not move from its position during the operation. If it is desired to draw a series of radial lines from a common center, one of the arms c is moved into the position shown at the left-hand end of Fig. 2, with the needle-point in contact with the edge of the ruler, and said arm is clamped in such position and its needle-point is made to pierce the common center above referred to, and the needle-point at the other end of the ruler is raised above the paper, when the ruler may be moved around the needle-point at the left and a series of radial lines $t t$ may be drawn, as indicated in Fig. 2. With the straight-edge or ruler A and arm c and its needle-point adjusted as just described, if the plate B , with its tongue D , be applied to said ruler and the tongue D be placed in the position shown in Fig. 2, if an ordinary pencil be placed upright in the angle formed by the end of the tongue D and the edge of the ruler A at u , circles or arcs of circles may be drawn by moving the instrument about the said needle-point as a fulcrum, as shown at $v v$ in Fig. 2, the radius of said circles or arcs being varied by moving the plate B along the ruler to a greater or less distance from said needle-point. When it is desired to draw angular lines, whether parallel or otherwise, other than

radial lines from a common center, as above described, the bevel attachment is applied to ruler or square tongue, as shown in Fig. 1, the tongue D is set to the desired angle, and the eccentric-pin $n o$ is rotated so as to clamp the plate B firmly upon the pin j , and thus lock said tongue in the desired position. When it is desired to draw a line at a given angle to another line, the protractor-segment E is applied to the tongue D , as shown in full lines in Fig. 1. The tongue D is moved about its axis of motion until the graduation-mark indicating the desired angle coincides with the edge of the ruler or square tongue. If it is desired to draw a line at the same or a different angle to the given line, but upon the opposite side of a perpendicular line and the opposite direction therefrom, the protractor-segment is turned the other side up and applied to the tongue D , and said tongue is moved about its pivot until the graduation-mark indicating the desired angle coincides with the edge of the ruler or square tongue, as shown in dotted lines in Fig. 1. The bevel-tongue D and the protractor-segment E may be used with equal facility and advantage with the straight-edge or ruler A , having the pivoted arms $c c$ and needle-points e or with the tongue of a T-square.

I claim—

1. The combination of a straight-edge or ruler, a radius-arm pivoted to the end thereof, a vertically-movable needle-point mounted in the free end of said arm, and means having provision for clamping said radius-arm at any desired angle to the edge of the ruler.

2. The combination of a straight-edge or ruler, a radius-arm pivoted to each end thereof, a vertically-movable needle-point mounted in the free end of each of said arms, and a clamping-screw for securing each of said radius-arms at any desired angle to the edge of the ruler.

3. In combination with a straight-edge or ruler, the arm c , having the slotted socket at its movable end, the vertically-movable needle-point $d e$, fitted to said slotted socket, the slotted tubular fulcrum pin or stud a , set in said straight-edge or ruler and forming a bearing for the arm c , and the tapered clamping-screw s , all constructed and arranged substantially as described.

4. The combination, with a straight-edge or ruler, of the plate B , provided with the guide-plates g and h and having formed in its inner end a hole or eye to receive a pivot-pin and partially severed through said eye by the slot k , the tongue D , provided with the pivot-pin j to fit the eye in the plate B , the link m , pivoted by one end to the plate B on one side of the slot k and provided with an eye in its other end to receive an eccentric, and the eccentric-pin $n o$, set in said plate B on the other side of said slot k and engaging said link m , substantially as shown and described.

5. The combination of a straight-edge or ruler, the plate B , provided with the guide-

plates *g* and *h*, the tongue pivoted to said plate B and provided with the holes *s s*, arranged in the center of the width of said tongue and at different distances from its pivotal connection, and the protractor-segment E, graduated upon both sides and provided at one end with the arm F, in which are set two pins *r r*, which project equally from both sides of said arm, all constructed, arranged, and adapted to operate substantially as and for the purpose described.

6. The combination of the straight-edge or ruler A, the vertically-movable needle-points

d e, and the series of thin buttons or bosses *a'*, secured to and projecting from the under surface of said straight-edge or ruler, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 18th day of August, A. D. 1891.

BURNSIDE E. SAWYER.

Witnesses:

FRANK H. SAWYER,
HENRY R. VAILLE.