Jan. 2, 1923. 1,440,625

B. L. PIERCE.
DRAWING INSTRUMENT.
FILED FEB. 23, 1921.

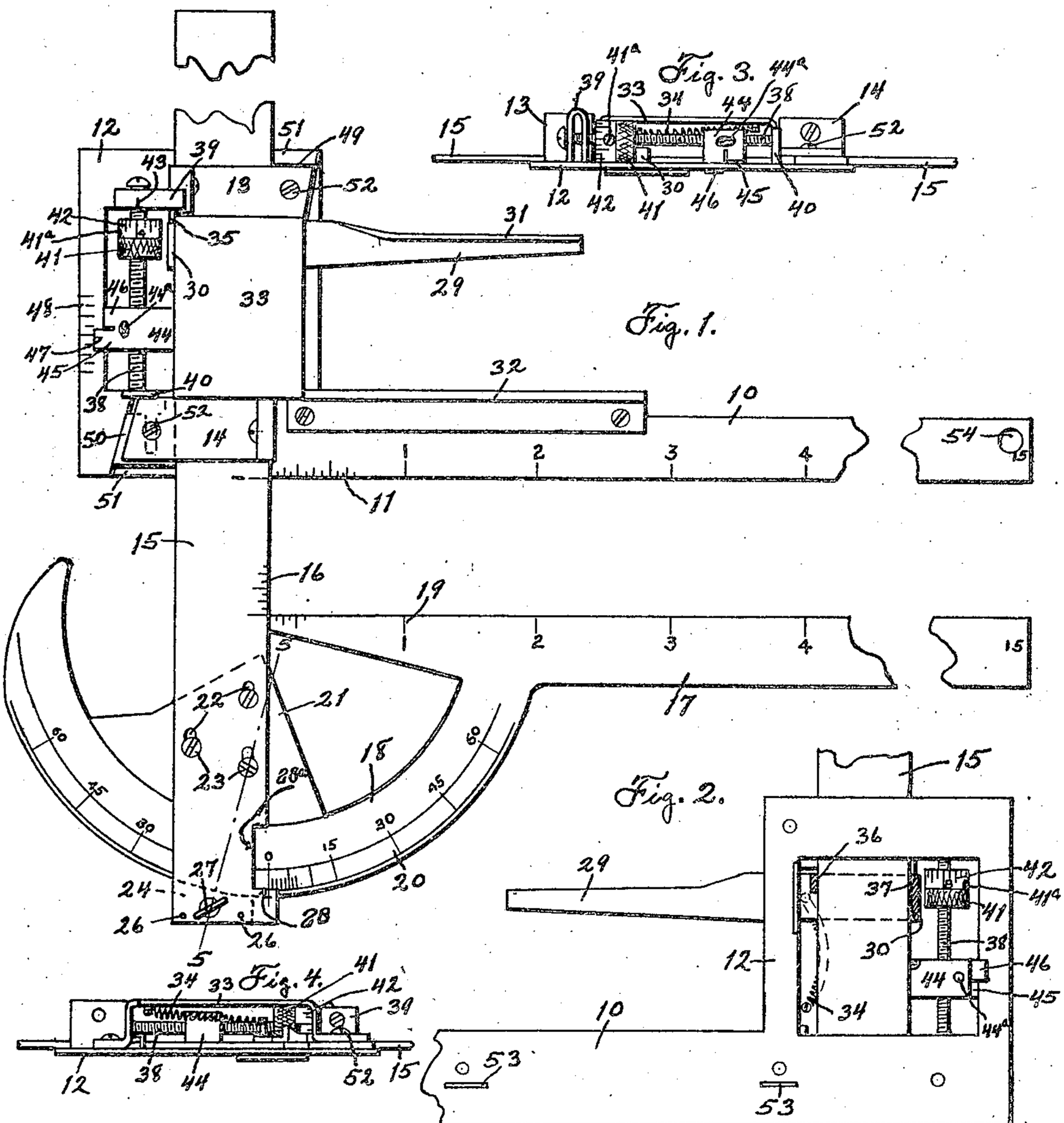

Fig. 1.

Fig. 3.

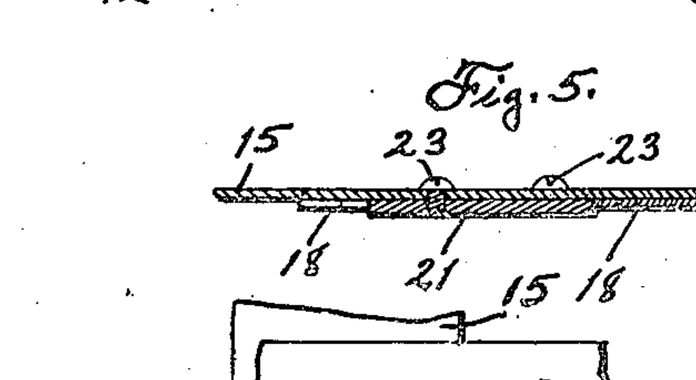

Fig. 4.

Fig. 5.

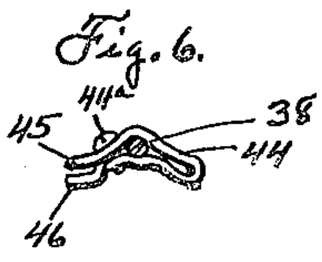

Fig. 6.

Fig. 2.

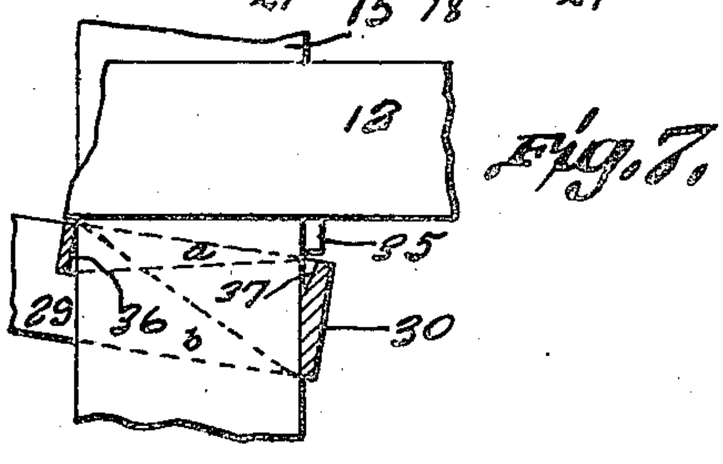

Fig. 7.

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UNITED STATES PATENT OFFICE.

BERNARD LEROY PIERCE, OF DES MOINES, IOWA.

DRAWING INSTRUMENT.

Application filed February 23, 1921. Serial No. 447,012.

To all whom it may concern:

Be it known that I, BERNARD L. PIERCE, a citizen of the United States of America, and resident of Des Moines, Polk County, Iowa, have invented a new and useful Drawing Instrument, of which the following is a specification.

The object of this invention is to provide an improved construction for an instrument particularly designed and adapted for use in drawing a series of parallel lines.

A further object of this invention is to provide a drafting instrument adapted to facilitate the uniform spacing of a series of parallel lines.

A further object of this invention is to provide a drafting instrument including a base rule, a slide rule slidably mounted relative to the base rule, manually operated means for moving said slide rule uniform and adjustable distances relative to the base rule, and a protractor blade carried by the slide rule and angularly adjustable thereon, whereby a series of lines may be laid off at selected intervals by the use of said protractor blade, parallel or at selected angles to said base rule.

A further object of this invention is to provide a drafting instrument including a base rule, a slide rule carrying a protractor so arranged and marked in opposite angles from parallel with said base rule so that equal left and right hand pitches are indicated relative to the extended blade of the protractor.

A further object of this invention is to provide a drafting instrument whereby a given space may be easily and neatly divided into any number of equal parts, and the extent of one of such parts determined accurately.

A further object of this invention is to provide a mechanism adapted for use in spacing any number of lines at any desired equal distances apart, while omitting any desired number of such lines.

A further object of this invention is to provide improved means for adjusting the degree of step-by-step movement of the slide rule.

A further object of this invention is to provide improved means for clamping and adjustably securing a member which is pivotally mounted relative to another member.

With these and other objects in view, my invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a plan view of my improved instrument, portions of the various blades being broken away to economize space. Figure 2 is a bottom plan view of portions of the base rule, slide rule and operating mechanism. Figures 3 and 4 are opposite side elevations illustrating the operating mechanism. Figure 5 is a cross-section on the line 5—5 of Figure 1. Figure 6 is a view of the adjustable stop member. Figure 7 is a detail bottom plan, partly in section, showing the operating lever and associated members, in part.

In the construction of the device as shown the numeral 10 designates a rule or blade which I have for convenience designated the base rule, which rule preferably is provided with a suitable graduated scale 11 on one of its longer margins. A rectangular frame 12 is formed on or fixed to the left end of the base rule 10 and lies in the same plane as said rule. Slide bearings 13, 14 are mounted on opposite end members of the frame 12 and a rule or blade 15, hereinafter referred to as the slide rule, is slidably mounted in said bearings. The slide rule 15 is provided with a suitable graduated scale 16 on one of its longer margins, a portion only of which is shown. A protractor blade 17 is provided and is secured to or forms a part of a protractor segment 18, which members are pivotally secured to the slide rule 15 for adjustment through an arc. The protractor blade 17 is provided with a suitably graduated scale 19 and the segment 18 is provided with a suitable arcuate scale 20, preferably extending in both directions from the zero point which is so located centrally of the segment and scale that it indicates a position of the protractor blade which is perpendicular to the slide rule 15 and parallel with the base rule 10. The protractor segment 18 is of semi-annular form, that is to say is formed with a semi-circular opening; and the inner end of the protractor blade 19 is extended across one side of said opening, preferably in tapered form, to contact with and underlie the slide rule 15.

A clamping segment 21 is mounted within the opening of the protractor segment 18 and

has a beveled arcuate edge or margin contacting with an oppositely beveled inner margin of said protractor segment. The slide rule 15 is formed with a number of longitudinal slots 22 through which pass screws 23 screwed into tapped holes in the clamping segment 21. A latching plate 24 is mounted on the lower surface of the slide blade 15 adjacent the outer margin of the protractor segment 18 and is formed with one arcuate margin beveled to engage and fit snugly to the beveled outer margin of said segment. At its opposite margin the latching plate 24 is formed with integral upturned pins 25 engaging loosely in holes 26 formed in the blade 15. A thumb screw 27 is loosely mounted through the slide blade 15 and is screwed into a tapped hole in the latching plate 24, and tightening movement of said screw tends to force said plate toward the segment 18 and cause its beveled arcuate margin to engage and clamp on the beveled outer margin of said segment and also to force said segment toward the clamping segment 21 and cause its beveled inner margin to clamp on the beveled outer margin of the latter member. Thus the protractor segment is clamped firmly between the clamping segment 21 and the latching plate 24, and pivotal movement of the protractor members relative to the slide blade is prevented. The slide blade 15 is formed at one margin with a notch 28^a and an indicator 28 overlying the scale 20, to indicate the degree of angularity of one of said members relative to the other. The screws 23 may be loosened and the plate or segment 21 moved closer to the protractor segment to compensate for wear.

An operating lever 29 is formed at one end with a loop 30 engaging loosely the slide blade 15 and said lever extends laterally across the inner member of the rectangular frame 12 near the base rule 10. That margin of the lever 29 farthest from the base rule 10 preferably is formed with an upturned flange 31 for engagement by the fingers of the operator in use, and a flanged member 32 preferably is secured to the adjacent portion of the base rule for a similar purpose. A top plate or housing member 33 is mounted on or fixed to the slide bearings 13, 14 and bridges the space between them, arching over the loop 30 of the operating lever. An expansive coil spring 34 is fixed at one end to the lever 29 and at the opposite end to the inside of the top plate or housing member 33, and tends to hold the free end of the lever away from the base rule 10, so that said lever normally occupies a position obliquely to said rule and the slide rule 15 as shown. Movement of the lever 29 under the influence of the spring 34 is limited by contact of the outer end of the loop 30 thereof with a lug 35 on the inner margin of the rectangular frame 12. The inside of the loop 30 is formed with opposed angular faces 36, 37 as shown in Figures 2 and 7, adapted frictionally to engage opposite side margins of the slide rule 15 when the free end of the lever 29 is moved toward the base rule against the influence of the spring 34. The diagonal line *a* in Figure 7 represents the line on which contact of the loop 30 is made with the blade 15 when manual pressure is applied to the lever 29, and the diagonal line *b* represents the line on which normal contact is made under the influence of the spring 34. As the line *a* is of less length than the line *b*, when manual pressure is applied to the lever the faces 36 and 37 of the loop frictionally engage the blade 15, so that continuation of the manual pressure between the lever 29 and blade 10 causes the blade 15 to move upwardly relative to said blade 10. Such engagement effects a gripping contact of the loop 30 with the slide rule and prevents relative sliding movement of said rule and the operating member.

To operate the device it is laid flat on a drawing table, board or sheet with the base rule in desired position, relative to a base line or mark for instance. The protractor blade 17 is then used as a guide for drawing or laying off other lines, particularly for a series of lines parallel with each other and either parallel or at a selected angle relative to the base line, or to the base rule 10. To move the protractor blade for successively forming such lines, the operator places his thumb against the flanged member 32 of the base rule and fingers of the same hand against the lever 29, or flange 31 thereof. Force is then applied to the lever 29, by pressure with the fingers, to move said lever toward the base rule, the first effect of such force being to move said lever to a position substantially parallel with said base rule, against the influence of the spring 34. When the lever reaches such position the angular faces 36, 37 of the loop 30 engage and grip the slide blade 15, and further pressure on the lever and base rule 10 causes sliding movement of said slide blade, and the members connected therewith, upwardly relative to the base rule. Means is provided to limit such movement, and such means preferably comprises an adjustable stop member carried by the rectangular frame 12. A screw 38 is arranged parallel with the slide rule and is journaled in bearings 39, 40 carried by end members of the frame 12. A thumb wheel or nut 41 is mounted on and fixed to the screw 38 for convenience in manually rotating it, and said wheel preferably is provided with a suitable graduated peripheral scale 42 to indicate to the operator the amount or extent of rotation, as by relation to a base

mark or line 43, which may be formed on one of the bearings. The knob 41 is adjustably secured to the screw 38 by means of a screw 41ª. The adjustable stop member 44 preferably is formed of a strip of metal bent around the screw 38 and retained thereon by means of a screw 44ª. These screws may be employed in adjusting and setting the several members in proper relation to the graduated scales. A stop member 44 is threaded on the screw 38 and is adapted to be engaged by that side of the loop 30 nearest the base rule 10, that is by the side opposite to the one which engages the lug 35. Such engagement limits sliding movement of the slide blade relative to the base rule as above described, and the amount of such movement may be gaged and adjusted by rotating the screw 38 in either direction to advance or retract the stop member 44 relative to the base blade. The stop member 44 is formed at its outer end with lugs 45, 46 slidingly engaging upper and lower faces respectively of the outer side member of the frame 12, to prevent rotation of the stop member on the screw, thus causing it to move longitudinally when the screw is rotated. The uppermost lug 45 is formed with an index mark 47 and the adjacent member of the frame 12 is formed with a graduated scale 48, to indicate the amount of movement of the stop member relative to said frame and the base rule.

Adjusting plates 49, 50 are provided for the respective slide bearings 13, 14. Each plate 49, 50 is set into a recess 51 in an end member of the frame 12 and has one inclined face engaging an inclined and beveled face of said recess, which inclined and beveled faces are on the sides of the plates farthest from the bearings 13, 14. The opposite margin of each plate 49, 50 is straight and parallel and in contact with the adjacent margin of the slide rule 15: said plates preferably being on opposite sides of said rule. A screw 52 is loosely mounted through each slide bearing 13, 14 and screwed into the adjusting plate 49 or 50 therebeneath. A pencil end or stylus may be employed to slide either of said adjusting plates along its recess 51 in either direction, when the screw 52 is loosened and by the relation of the inclined face of said adjusting plate to force or release the slide blade to desired position with respect to the graduated scale of the base rule and at right angles to it. Then the screws 52 are tightened to hold the adjustable parts immovable against the slide rule when pressure is applied to lever 29 or when the protractor blade is used as a straightedge for a marking or cutting tool. In such adjusting operation the plates 49, 50 have the functions of wedges between the inclined faces of the recesses 51 and the opposed margins of the slide rule, and may be used selectively or conjunctively to secure and maintain the proper position of the slide rule perpendicular to the base rule.

The base rule 10 and frame 12 may be provided with projecting teeth 53 on their lower faces, to engage the paper or board and prevent slipping of the instrument in use. The outer end of the base rule may be formed with a hole 54 to receive a thumb tack or other securing device at times when desired.

This instrument may be used in lieu of T-square and triangles and be employed as a guide in drawing or laying off all kinds of straight lines, either vertical, horizontal or oblique. It is very convenient for cross-hatching, as a series of lines may be drawn very rapidly and uniformly spaced by the use of the protractor blade and operating lever, and said lines may be parallel with each other and with the base rule, or at any desired angle relative to the latter. The degree of spacing is of course determined by manipulation of the stop member 45 through the screw 40, and the amount of such spacing may be determined to a very small fraction of an inch, by means of the scales 42 and 48. The graduation of the scale 48 and its relation to the mark 47 of the stop member is in accord with the threads of the spacing adjustment screw 38; and as the number of such threads per inch are known, the desired fraction of an inch may be determined.

The instrument may be used for dividing a given space into a given number of equal parts, after the manner of compasses or dividers, but without leaving any objectionable marks or holes in the paper or board. It is also useful for laying off scores for manuscript sheet music, it being an easy matter to omit certain lines, as between successive staffs, without disturbing the continuity and accuracy of the spacing.

Other uses of the instrument will be readily understood or developed by those skilled in the art.

I claim as my invention—

1. A drawing instrument, comprising a base rule formed with slide bearings, a slide rule slidably mounted in said bearings and extending at an angle to said base rule, a protractor rule secured to said slide rule and extending at an angle thereto, and an operating member adapted for manual actuation to engage said slide rule and cause step-by-step sliding movement thereof.

2. A drawing instrument, comprising a base rule formed with slide bearings, a slide rule slidably mounted in said bearings and extending at an angle to said rule, a protractor rule secured to said slide rule and extending at an angle thereto, and an operating member formed with a loop loosely engaging said slide rule, said member being

adapted for manual movement in one direction to cause said loop to frictionally engage and cause sliding movement of said slide rule.

3. A drawing instrument, comprising a base rule formed with a slide bearing, a slide rule slidably mounted in said bearing and extending at an angle thereto, a protractor rule secured to said slide rule and extending at an angle thereto, and an operating member formed with a loop loosely embracing said slide rule, said member being adapted for manual movement in one direction to cause said loop to frictionally engage and effect sliding movement of said slide rule, together with yielding means tending to move said operating member in the opposite direction.

4. A drafting instrument, comprising a base rule formed with a slide bearing, a slide rule slidably mounted in said bearing and extending at an angle to said base rule, a protractor rule secured to said slide rule and extending at an angle thereto, an operating member adapted for manual movement in one direction to engage and cause sliding movement of said slide rule, yielding means being provided for moving said operating member in the opposite direction, and adjustable means for limiting the sliding movement of said slide rule.

5. A drafting instrument, comprising a base rule formed with a slide bearing, a slide rule slidably mounted in said bearing and extending at an angle to said base rule, a protractor rule secured to said slide rule and extending at an angle to said slide rule, a spring-pressed operating member formed with a loop loosely embracing said slide rule, said member being adapted for manual movement against the pressure of said spring to cause said loop to frictionally engage and effect sliding movement of said slide rule, and a stop adjustably carried by said base rule and adapted for engagement by said loop to limit sliding movement of said slide rule.

6. A drafting instrument, comprising a base rule formed with a slide bearing, a slide rule slidably mounted in said bearing and extending at an angle to said base rule, a protractor rule secured to said slide rule and extending at an angle thereto, an operating member formed with a loop loosely embracing said slide rule, said member being adapted for manual movement in one direction whereby said loop engages and causes sliding movement of said slide rule, a screw carried by said base rule, and a stop adjustably mounted on said screw and adapted for engagement by said slide rule to limit the sliding movement thereof.

7. In a drafting instrument, a base rule, a slide bearing thereon, and a slide rule slidably mounted in said bearing, said base rule being formed with a recess at one side of said slide bearing and having an inclined face opposite thereto, an adjusting plate formed with an inclined face engaging the inclined face of said recess and engaging at its opposite margin a margin of said slide rule, and a screw mounted through said bearing and seated in said adjusting plate, whereby the angularity of said rules may be adjusted by movement of said adjusting plate.

8. In a drafting instrument, a rule and a second rule arranged at an angle to the first rule, the second rule being formed with a protractor of semi-annular form having beveled edges, a segment adjustably secured to the first rule and having its arcuate margin beveled and in engagement with the inner margin of said protractor, a clamping plate carried by the first rule and having an arcuate beveled margin in contact with the outer margin of said protractor, said plate being formed with teeth loosely seated in said first rule, and a screw passing loosely through said first rule and seated in said plate.

Signed at Des Moines, in the county of Polk and State of Iowa, this 28th day of December, 1920.

BERNARD LEROY PIERCE.