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E. D. MACKINTOSH.

DRAWING AND PLOTTING DEVICE.

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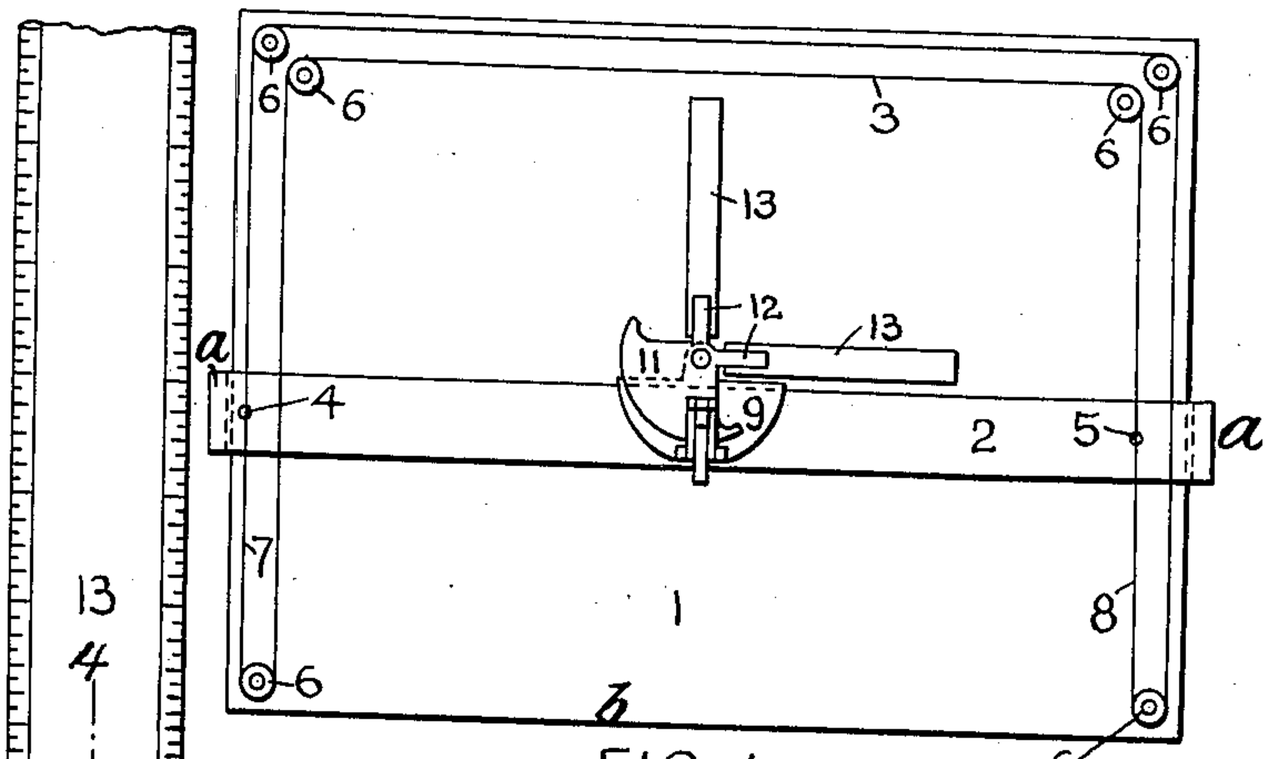

FIG. 1.

FIG. 2

FIG. 4

FIG. 3

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DRAWING AND PLOTTING DEVICE.

No. 814,789. Specification of Letters Patent. Patented March 13, 1906.

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To all whom it may concern:

Be it known that I, EDWARD D. MACKINTOSH, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Drawing and Plotting Devices, of which the following is a specification sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

My invention relates to the class of drawing and plotting devices in which a movable support provided with one or more adjustable rulers or straight-edges is controlled by mechanism which preserves its parallelism with relation to a prescribed line or base under all conditions of use.

The object of my invention is to facilitate and at the same time render more positive the manipulation of such appliances, which result I accomplish by means substantially as herein set forth, whereby a protractor and connections are rendered readily adjustable longitudinally upon and with relation to the laterally-movable flat blade and whereby the said protractor and connections while normally loose thereon may be quickly and conveniently locked temporarily in a desired or prescribed position upon said laterally-movable flat blade in a manner essentially positive, for the time being, to all intents and purposes.

My invention also includes certain details in the construction and arrangement of parts hereinafter described and claimed specifically.

In the accompanying drawings, Figure 1 is a plan representing more or less diagrammatically the essential features of my invention. Fig. 2 is a plan, upon an enlarged scale, of the protractor, slide, and connections and adjoining parts. Fig. 3 is an elevation of the parts shown in Fig. 2. Fig. 4 is a section taken upon plane of line 4 4, Fig. 2.

The character 1 represents a drawing board or table adapted to hold the paper or other material, upon the surface of which a plan or drawing is to be made.

2 is a straight flat blade or equivalent supporting cross-bar extending transversely over the board or table 1 and connected to and controlled by mechanism by which it is always maintained in parallelism with a real or imaginary base or line *b*, which for convenience of reference may be herein designated the "horizontal" base. There are various well-known mechanical expedients which may be resorted to to preserve the alinement and parallelism of the supporting-blade or its equivalent irrespective of the position of the same over and upon the drawing-surface, and I do not restrict myself in this respect, the arrangement described herein being shown by way of illustration only, since the distinguishing feature of my invention in this connection consists in the fact that whereas heretofore the protractor 11 has been pivotally supported upon a fixed center on the laterally-movable flat blade 2, in the present case such center or pivot 10 is carried upon a slide 9, resting on the top of and adjustable longitudinally upon the said parallelly-movable flat blade 2, the mechanism for maintaining the parallelism of the latter being obviously of secondary import. In the arrangement shown the parallelly-movable flat blade is at or near its opposite extremities fastened to a flexible band 3, preferably formed of fine piano-wire or the like, as at 4 and 5, Fig. 1. This band 3 passes around six guides 6, which I prefer to make in the form of loose pulleys turning on pins secured to the table or board 1. The pulleys 6 are so located on the board or table 1 in any suitable manner that the two strands 7 and 8 of the flexible band 3 are parallel and in the present case perpendicular or vertical with relation to the base-line *b*, although this is not material provided the said strands 7 and 8 are parallel, so that any longitudinal movement of one strand is accompanied by a like and equal movement of the other strand, causing the flat blade 2, fastened to the said two strands, to move laterally to the same extent at both ends.

The slide 9 is made in the form of a plate, which normally rests loosely above the bottom of the flat blade 2 and is fitted thereto in such manner as to be capable of movement independently lengthwise of the same while maintaining a prescribed relation thereto, the flat blade 2 (shown in Fig. 1 of the drawings) being provided with downwardly-projecting lips or shoulders *a a* (shown in dotted lines) at either end, which limit its movement longitudinally by reason of their proximity to the edges of the board or table 1. This limitation of the longitudinal movement of the blade 2 is desirable in the arrangement shown in the drawings, but is not essential in mechanism for preserving the parallelism of

the supporting-blade 2, in which provision is made for the longitudinal as well as lateral movement of said parallelly-movable blade 2. It is to be noted in this connection that the under surface of the blade 2 rests directly upon the board 1.

A pivot 10 is fitted to turn in an eye 10ª in the slide 9, said pivot 10 being rigidly secured to the protractor 11 by any suitable or well-known means, as by the set-screw and washer shown in Figs. 2 and 4 of the drawings. The protractor 11 is provided with one or more arms 12, preferably two, extending radially from the pivotal center of the protractor and at right angles with relation to each other. The radial arm or arms 12 afford means of attachment for one or more rulers or straight-edges 13, on the edge or edges of which any suitable or desired scale or scales may be represented. The concentric edge of the protractor 11 may be beveled, as shown at 14 in the drawings, although this is not essential. Such concentric edge is, however, preferably formed with notches 15 for engagement with a pawl 16, pivotally connected to the slide 9 and held against the concentric edge of the protractor 11 (or in any of the notches 15 therein) by a spring 17. The latter is made strong enough and the ratchet and pawl are so formed and arranged that the parts are held only with sufficient force to prevent their accidental displacement when moved about over the surface to be drawn upon, the resistance to be overcome being insufficient to interfere materially with the intentional shifting or adjustment of the protractor from one notch to another or to any intermediate position between notches with relation to the pawl 16. The notches are located on the concentric edge of the protractor 11 in such manner as to engage the pawl successively when the ruler or rulers 13 stand at certain frequently-required angles, more particularly at the vertical and horizontal, and at thirty, forty-five, and sixty degrees from the latter. The ruler or rulers may be set to any other desired angle by setting the proper marks on the concentric scale of the protractor to the index-line *i* on a block 18, secured to the slide 9, adjoining said concentric edge of the protractor, as shown in Fig. 2. Another block 19, also secured to the slide 9, adjoining the said concentric edge of the protractor 11, may be clamped against such concentric edge by means of a screw-nut or equivalent 20 when it is desired to secure the protractor positively, for the time being, at any angle to which it is set. This clamp 20 need not, however, be used ordinarily when such angle is one at which the pawl enters one of the notches 15.

The slide 9 is formed with a lip or shoulder 21 to bear against the long straight-edge of the parallelly-movable flat blade 2, and a dog 22 is arranged to bear against the opposite edge of said support or blade. This dog 22 is secured to a bolt 23, the main portion 23ª of which rests between and is guided by the inner edges of a bifurcated lever 24, fulcrumed between lugs 25 25, integral with the slide 9. The under surface of this bifurcated lever 24 rests upon the protractor 11, and when pen or pencil is to be used against one of the edges of a ruler or straight-edge 13 the said lever 24 is pressed down, so as to pinch the protractor between it and the slide 9, and thus tend to prevent the shifting or turning of the protractor on its pivot; but this pressure instead of being applied directly to the lever 24 is applied primarily to the arm 26 of a bell-crank lever 27, fulcrumed between the two ears 29 on the said lever 24, the other arm 28 of the bell-crank lever 27 engaging a slot or recess 28ª (see Fig. 4) in the bolt 23 before named, so that the pressure on the arm 26, which effects the clamping of the protractor 11 to the slide 9, also acts through the bolt 23 to draw the dog 22, attached thereto, into contact with the blade 2, thereby pinching the latter between the said dog 22 and the lip 21 of the slide 9. The dog 22 is preferably made adjustable upon the bolt 23 to adapt the device to flat blades 2 of different widths. This may be accomplished in any desired manner, as by means of a slot 30, formed in the lever 23, and a set-screw 31, passing through said slot and engaging with a female thread formed for its reception in the dog 22.

In use where two radially-arranged rulers are used in conjunction at right angles to each other, as shown in the drawings, lines perpendicular to each other may be drawn against the edges of the said rulers, the protractor being set to give them the desired angle to the horizontal or vertical and pressure being applied to the arm 26 to simultaneously clamp the protractor 11 to its slide 9 and the latter to the blade 2 and to hold the blade 2 in position upon the drawing board or table, all this being accomplished with sufficient force to prevent any of the parts from shifting when a pen or pencil is brought to bear against an edge of a ruler, but with an expenditure of strength on the part of the user no greater, if as great, as that required to hold the blade of an ordinary T in position during use. This feature of practically locking the parts temporarily in a prescribed position for actual use by a slight and natural pressure upon the arm 26 is an important and distinguishing feature of my invention, the parts being so arranged that upon the removal of the pressure the slide may be freely adjusted longitudinally upon the parallelly-movable support 2.

By moving the blade 2 laterally and the slide 9 lengthwise thereon it is obvious that the ruler or rulers 13 may be brought to any required position upon the surface to be drawn upon, and in drawing lines the scale or

scales on the ruler or rulers may advantageously be used to determine their lengths.

Distinguishing features of my structure are that the flat blade 2 rests on the drawing-board when it is available for ruling long lines and that the slide 9 consists of a plate which simply rests above the bottom of the flat blade 2 and is normally loose thereon, being held against displacement on the blade 2 by the lip 21 at one edge of the blade and the dog 22 at the other edge thereof. Thus in the absence of pressure applied to force the dog 22 against the opposed edge of the blade 2 the slide 9 has a slight lateral play upon the blade 2, such play being limited by the dog 22 and lip 21, but being sufficient to admit of the quick and easy adjustment of the slide longitudinally in either direction upon the flat blade 2. The pinching of the edges of the flat blade 2 by and between the lip 21 and the dog 22, as set forth, is also a distinguishing and important feature, since the slide may be thereby instantaneously locked in a prescribed position upon the blade 2 and as quickly released.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a drawing and plotting instrument of the character designated the combination of a laterally-movable blade, means connected therewith for maintaining its parallelism with relation to a prescribed base-line, a slide movable longitudinally upon said laterally-movable blade, and a protractor pivotally attached to said slide and formed with means for the support of a ruler and a pressure-lever and bolt actuated thereby upon the slide, whereby a downward pressure may be exerted upon the protractor, slide and blade, to hold the parts in a prescribed position with relation to each other, the slide being simultaneously clamped to the blade for the purpose described.

2. In a drawing and plotting instrument of the character designated, the combination with a drawing-board of a laterally-movable blade, means connected therewith and with the board for maintaining its parallelism with relation to a prescribed base-line on the board, a slide movable longitudinally upon said laterally-movable blade, a protractor pivotally attached to said slide and formed with means for the support of a ruler, and a pressure-lever and bolt actuated thereby upon the slide whereby a downward pressure may be exerted upon the protractor, slide, blade and board to hold the parts in a prescribed position with relation to each other, the slide being simultaneously clamped to the blade for the purpose described.

3. In a drawing and plotting instrument of the character designated, the combination with a drawing-board of a laterally-movable blade, means connected therewith and with the board for maintaining its parallelism with relation to a prescribed base-line on the board, a slide movable longitudinally upon said laterally-movable blade, a protractor pivotally attached to said slide and formed with means for the support of a ruler, means for adjusting the protractor axially on the slide and holding it in a prescribed position thereon, and a pressure-lever and bolt actuated thereby upon the slide, whereby a downward pressure may be exerted upon the protractor, slide, blade and board, to hold the parts in a prescribed position with relation to each other, the slide being simultaneously clamped to the blade for the purpose described.

4. In a drawing and plotting instrument, a laterally-movable blade, a slide movable longitudinally upon said laterally-movable blade, a ruler supported on said slide, and means whereby pressure acting temporarily in a direction toward and perpendicular to the flat side of the said blade will cause the said slide to be temporarily clamped edgewise upon and against said laterally-movable blade in the direction of the width of the latter for the purpose described.

5. In a drawing and plotting instrument a blade, a slide movable longitudinally thereon, and a pressure-lever and bolt so arranged that the movement of an arm of the pressure-lever toward a flat side of the blade causes the latter to be pinched on two edges between a lip on the slide and another on the bolt.

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Witnesses:
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