Nov. 15, 1938. A. LANGSNER 2,137,004

DRAFTING APPARATUS

Filed Jan. 30, 1937

FIG. 1.

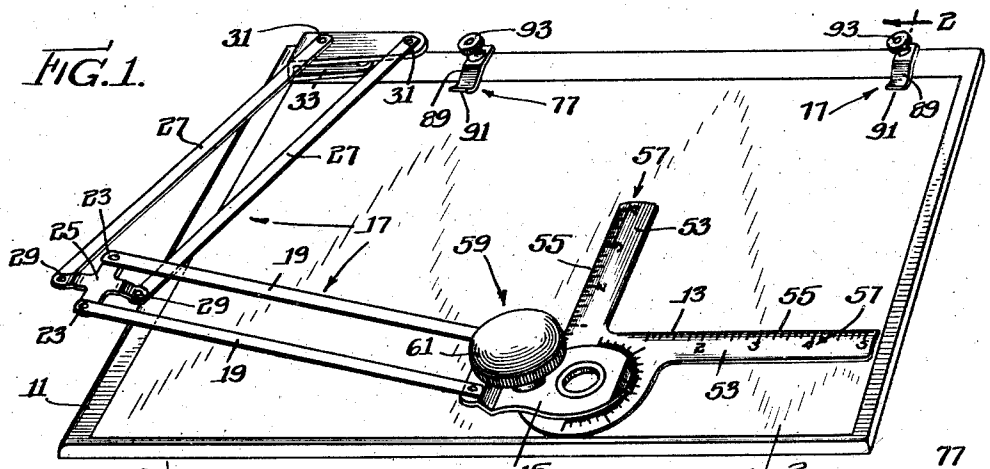


FIG. 2.

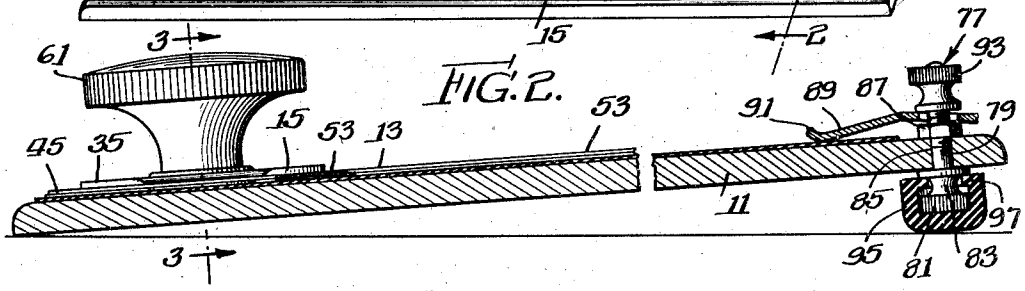


FIG. 3.

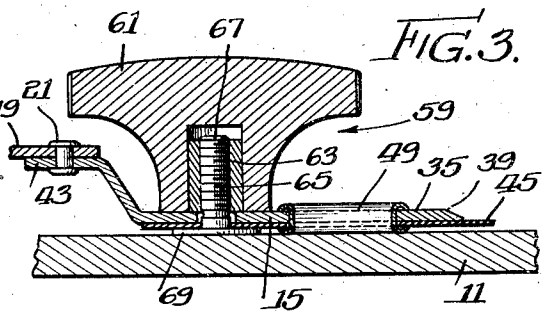


FIG. 4.

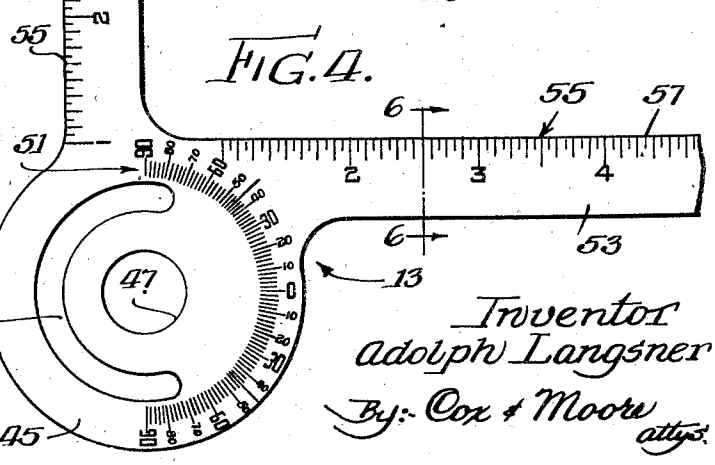


FIG. 5.

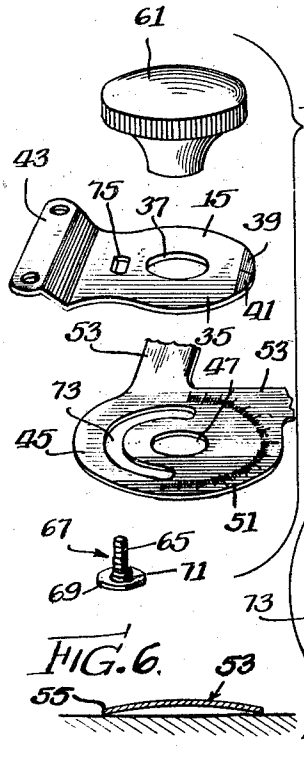


FIG. 6.

Inventor
Adolph Langsner
By: Cox & Moore
attys.

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UNITED STATES PATENT OFFICE

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DRAFTING APPARATUS

Adolph Langsner, Chicago, Ill., assignor to Eugene Dietzgen Co., Chicago, Ill., a corporation of Delaware

Application January 30, 1937, Serial No. 123,255

8 Claims. (Cl. 33—79)

My invention relates in general to drafting equipment and has more particular reference to parallel line apparatus, more especially adapted for use on drawing boards or tables.

An important object of the invention is to provide simplified parallel line equipment for drafting tables and the like; a further object being to provide readily operable means for adjusting the line ruling elements to any desired angularity with respect to the drawing table.

Another important object is to provide parallel line ruling equipment including a head adapted to move freely throughout the area of the drawing table and guiding means for holding the head at all times in a predetermined angular relationship with respect to the table, and a combined holder and clamp for securing the ruling means in adjusted angular position with respect to the head and also affording means for shifting the head with respect to the drawing table.

Another important object is to provide ruling equipment of the character mentioned, including cooperating scale and index means on the head and ruling element to indicate the adjusted angularity of the parts, wherein the scale means includes a protractor scale adapted to indicate angles between zero and 90 degrees, the scale being graduated so as to emphasize most frequently used angles, as zero, 30, 45, 60 and 90 degree angles.

Another important object is to provide equipment of the character mentioned, wherein the line ruling element and the head are formed as stampings, preferably of sheet metal, the parts being connected together for relative rotation, preferably by means of a single, centrally located rivet; a further object being to provide a single, knob-controlled element operable as a clamp to secure the line ruling element and the head together in relatively adjusted angular position and operable also to shift the head and the ruling element upon the drawing table; a still further object being to form the ruling element with a slot of circular configuration and to arrange the clamp as a bolt having a portion extending in said slot and also through a perforation in the head and adapted, in combination with a knob-like nut, to provide the combined clamping and head fastening element.

The ruling equipment of the present invention is particularly adapted for mounting on a drawing board and I have provided pantographic means adapted to be fastened on a board for holding the head against relative rotation with respect to the board; and it is a further object of my present invention to provide improved clamp means for securing paper or other sheet-like drafting material on the board in position to be ruled by means of my parallel line apparatus. To this end it is an important object of the invention to provide a fitting adapted to extend on opposite sides of a drafting board to provide a board support or foot on one side and a sheet clip on the other; a further object being to form the combined board support and sheet clip as a bolt having a head on one side of the board and a stem projecting on the other side in position to receive a spring element secured thereon by means of a nut threaded on said projecting stem; a still further object of the invention being to utilize parts adapted for fabrication in automatic screw machines.

Another important object is to form the combined board support and sheet clip as a headed stud adapted for mounting in an edge of a drawing board, with the head and stem of the stud projecting on opposite sides of the board, and to form the head with a necked portion so that the same may be covered with a resilient, preferably rubber, cap, the cap having portions fitting the necked portions of the stud to thereby retain the cap in place to form a resilient foot for the board.

These and numerous other important objects, advantages and inherent functions and purposes of the invention will become apparent as the same is more fully understood from the following description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment of the invention.

Referring to the drawing:

Figure 1 is a perspective view of drafting equipment embodying my present invention, as applied on a drawing board;

Figure 2 is a sectional view taken substantially along the line 2—2 in Figure 1;

Figure 3 is a sectional view taken substantially along the line 3—3 in Figure 2;

Figure 4 is a partial plane view of a line ruling element forming a part of the drafting equipment;

Figure 5 is an exploded view of parts of the equipment shown in perspective; and

Figure 6 is a sectional view taken substantially along the line 6—6 in Figure 4.

To illustrate my invention, I have shown on the drawing parallel line apparatus adapted for use on a drawing board or table 11, the parallel line apparatus including a line drawing element 13, a support head 15 on which the ruling ele-

ment 13 is rotatable, and means 17 for holding the head 15 against relative rotation with respect to the drawing board or table, while permitting free movement thereof substantially over the entire area of the table.

The guiding means 17 may be of any suitable or preferred character, and for the purpose of illustrating the present invention I have shown the same as a pantographic structure including parallel links 19 pivoted at one end, as at 21, at spaced points on the head 15, the arms 19 being pivotally connected at their opposite ends, as at 23, upon a link 25. The pantograph 17 also includes the parallel arms 27, the ends of which are pivoted, as at 29, at spaced points in the link 25, the opposite ends of the arms 27 being in turn pivoted, as at 31, upon a bracket 33, which may be secured to the drafting table 11, preferably at a corner thereof.

The head 15 preferably comprises a sheet metal stamping having a generally circular portion 35 formed with a central opening 37. The edge of the portion 35 is preferably bevelled, as at 39, and provided with an index mark 41 comprising a line extending radially of the center of the perforation 37. On the side of the portion 35 diametrically opposite from the index 41, the head 15 is formed with an offset flange portion 43 providing means on which the arms 19 may be pivotally connected to the head.

The line ruling element 13 also preferably comprises a sheet metal stamping having a circular mounting portion 45 provided with a central opening 47 which may be, and preferably is, of size similar to the opening 37 of the head. The elements 13 and 15 are pivotally connected together, preferably by means of an annular rivet 49, the same comprising a cylinder of sheet metal adapted to fit within the alined openings 37 and 47, the opposite end edges of the cylinder being peened over, as shown clearly in Figure 3, upon the oppositely facing top surface of the head 15 and bottom surface of the element 13. The head and ruling element are thus joined for relative angular movement about the central axis of the alined openings 37 and 47, the head 15 overlying the mounting portions 45 of the line ruling element 13. The mounting portions 45 have marginal edges projecting outwardly of the preferably circular edge of the supporting head 15 to provide a scale-carrying area on which is or may be formed a protractor scale 51 closely adjacent the marginal edge of the head 15, and in position to cooperate with the index mark 41 thereon, said protractor scale 51 preferably extending from a central zero graduation in opposite directions with respect to the central axis of rotation of the elements 13 and 15 through at least ninety degrees, said scale being preferably graduated at ten-degree intervals and having frequently used graduations, such as 30 degrees, 60 degrees and 90 degrees, as well as the graduation representing zero, indicated by means of prominent indicia. Both sections of the scale also preferably include a distinctive 45-degree graduation, all as clearly shown in Figure 4 of the drawing. It is of course within the contemplation of my present invention to form the scale 51 at the edge of the head 15, as for example by registration of the zero graduation with the position occupied by the index mark 41 in the illustrated embodiment, in which case the index mark may be transferred to the line ruling element 13 in the position occupied by the zero graduation of the scale 51 in the illustrated embodiment. The index mark, however, may of course be arranged in any preferred location. In applying the scale on the head 15 it may be desirable to bevel the edge portions of the head on which the scale is mounted.

The ruling element 13 also includes projecting portions 53 defining straight edges 55 preferably extending at right angles. The portions 53 may carry scales 57 graduated in terms of linear measurement along said straight edges, if desired. It will be noted, also, that one of the straight edges extends parallel with a line passing through the center of rotation of the parts 13 and 15 and the zero graduation of the scale 51, while the other straight edge 55 is parallel with a line extending through said axis of rotation and the 90-degree graduations of the scale 51. Thus by adjusting the element 13 on the head 15 to register the index mark 41 with the zero graduation of the scale, a horizontal line may be drawn along one straight edge and a vertical line along the other. This may be accomplished for all positions within the area of the drawing board at which the head is or may be adjusted. Similarly, by turning the element 13 to register any of the graduations of the scale 51 with the index 41, lines may be drawn along the straight edges at corresponding angles with respect to the horizontal and vertical.

I have provided simplified clamping means 59 for securing the element 13 firmly and quickly in any adjusted position to which it may be set, said clamping means being as easily operable to release the parts for adjustment, and serving also as a convenient handle for moving the head and the ruling element carried therebetween to any desired position within the area of the drawing table. This improved combination clamping and adjusting means 59 comprises a relatively large grasping knob 61 for convenient manipulation, said knob being provided with a threaded bushing 63 for receiving the threaded stem 65 of a bolt 67. This bolt has a preferably flat, smooth head 69 and is formed preferably with a non-circular shouldered portion intermediate the head 69 and stem 65. The line ruling element 13 in its mounting portion 45 is or may be formed with a slot 73 of circular configuration, the center of curvature of the slot preferably coinciding with the axis of relative movement of the elements 13 and 15. This slot 73 preferably subtends slightly more than 180 degrees with respect to said axis of rotation, and is disposed in the mounting portion 45 opposite from the scale 51. The head 15 also is or may be provided with a non-circular opening 75 formed between the opening 37 and the flange 43 at a distance from the axis of relative rotation of the parts 13 and 15 equal to the radius of curvature of the slot 73. The bolt 67 is assembled with its head 69 underlying the mounting portions 45, the non-circular portion 71 of the bolt extending through the slot 73 and through the opening 75, which seats said non-circular portion 71 in order to prevent relative rotation of the bolt with respect to the head.

The stem 65 projects upwardly of the head 15 in position to threadingly receive the knob 61 so that by tightening the knob upon the bolt 67 the parts 13 and 15 may be clamped firmly together by and between the bolt head 69 and the knob 61. When so clamped, the knob may be utilized as a handle to shift the head and the ruling element 13 in adjusted position to any desired position within the area of the drawing table. To release the parts for adjustment it is merely necessary to turn the knob 61 fractionally

to loosen the clamp and permit the element 13 to move on the head as by grasping one of the projecting portions 53. After adjustment the clamp may be easily and quickly reset.

As heretofore stated, the parallel line ruling equipment is adapted for use on a drawing table and is especially well suited for use on drawing boards to provide easily operable, inexpensive means for ruling paper and other sheet-like drawing material which may be fastened on the board, and I have also provided improved clip means 77 for securing said material on the board or table 11 in position to be ruled. These clips are preferably mounted on the board along one edge thereof and provide resilient supporting legs, by means of which the board may be held on a flat base, to thereby facilitate drawing operations. To this end the clip means 77 comprises a stud 79 having a head 81 formed with a restricted neck 83 and a stem, the stud being adapted for assembly on the board with its stem extending through a perforation 85 in the board and its head 81 projecting on the lower side of the board. The stem of the stud projects from the upper surface of the board and is held in place by means of a nut 87. Above the nut 87 the stem receives a clip element 89, preferably comprising a strip of sheet metal having a perforation for receiving the head, and extending thence outwardly of the stud and having a preferably curled end 91 for engagement with the sheet to be held. The clip 89 is secured in clamping position by means of a thumb nut 93 threaded on the end of the stud, the clip 89 being so formed that upon tightening the nut 93 on the stud, the end 91 of the clip will be yieldingly pressed toward and upon the upper surface of the board 11 to thereby firmly clip the sheet in place. By loosening the nut 93 the sheet will be released.

I prefer also to provide a resilient cap 95 on the stud head 81, said cap having a central chamber for receiving said head and an opening defined by an integral inwardly extending annular flange 97 adapted to engage with the necked portion 83 of the stud head whereby to firmly hold the cap 95 in place thereon. Such an arrangement constitutes the stud head 81 as a resilient foot for supporting the drawing board.

It is thought that the invention and its numerous attendant advantages will be understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its attendant advantages, the form herein disclosed being a preferred embodiment for the purpose of illustrating the invention.

Having thus described my invention, what is claimed as new and is desired to be secured by Letters Patent of the United States is as follows:

1. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said rulling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion.

2. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said stud comprising a bearing portion formed with oppositely facing, flattened side surfaces adapted to engage the opposite sides of said curved slot to guide the stud in moving along the curved slot and to hold the stud from turning on its axis when said knob is turned thereon in releasing or tightening said clamping means.

3. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved

slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said stud comprising a bearing portion formed with oppositely facing, flattened side surfaces adapted to engage the opposite sides of said curved slot to guide the stud in moving along the curved slot and to hold the stud from turning on its axis when said knob is turned thereon in releasing or tightening said clamping means, said opening also having flattened sides to snugly engage the bearing portion of said stud.

4. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said plate-like portion having a curved marginal edge and said mounting portion being exposed outwardly of said edge, one of said portions carrying a graduated angularity scale adjacent the curved marginal edge of said plate-like portion and concentric with respect to said axis of rotation, the other member carrying an index at the edge of said plate-like portion opposite said scale whereby to indicate the relative adjusted position of the holder and ruling guide members.

5. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said plate-like portion having a curved marginal edge and said mounting portion being exposed outwardly of said edge and carrying thereon a graduated angularity scale adjacent the curved edge of said plate-like portion and concentric with respect to said axis of rotation, said plate-like portion carrying an index thereon at the curved edge thereof adjacent said scale whereby to indicate the relative angularly adjusted position of the holder and ruling guide members.

6. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said plate-like portion having a curved marginal edge and said mounting portion being exposed outwardly of said edge and carrying thereon a graduated angularity scale adjacent the curved edge of said plate-like portion and concentric with respect to said axis of rotation, said plate-like portion carrying an index thereon at the curved edge thereof adjacent said scale whereby to indicate the relative angularly adjusted position of the holder and ruling guide members, said index comprising a mark on said plate-like portion, said mark, the said axis of rotation and the axis of said stud all lying in a common plane.

7. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size

adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said plate-like portion having a curved marginal edge and said mounting portion being exposed outwardly of said edge and carrying thereon a graduated angularity scale adjacent the curved edge of said plate-like portion and concentric with respect to said axis of rotation, said plate-like portion carrying an index thereon at the curved edge thereof adjacent said scale whereby to indicate the relative angularly adjusted position of the holder and ruling guide members, said index comprising a mark on said plate-like portion on the side of said axis of rotation vertically opposite the stud opening.

8. In drafting apparatus comprising a ruling guide member having a mounting portion, a holder member having a plate-like portion for supporting said ruling guide member, and means connecting said plate-like and mounting portions together for relative angular movement of said ruling guide and holder members about an axis of rotation, the combination with said plate-like and mounting portions of clamping means for securing the ruling guide and holder members in adjusted relative angular position, said clamping means comprising a stud carried by and extending through said plate-like and mounting portions, and a cooperating, manually turnable head having threaded engagement with said stud and comprising a knob of substantial size adapted for convenient grasping in shifting the holder and ruling guide members within a definite drafting area, said mounting portion being formed with a curved slot having a center of curvature coinciding with said axis of rotation, and said plate-like portion overlying and concealing said curved slot and having a stud opening in said plate-like portion spaced from said axis of rotation in position to register with said curved slot, said stud having a head underlying said mounting portion and a stem extending in said slot and said stud opening and carrying said knob upwardly of said plate-like portion, said plate-like portion having a marginal edge and said mounting portion being exposed outwardly of said edge and carrying thereon a graduated angularity scale adjacent the edge of said plate-like portion and concentric with respect to said axis of rotation, the edge of said plate-like portion having a beveled portion and an index mark on said beveled portion adjacent said scale whereby to indicate the relative angularly adjusted position of the holder and ruling guide members.

ADOLPH LANGSNER.