May 10, 1938. W. J. GREENLEAF ET AL 2,116,887

DRAFTING DEVICE

Filed June 18, 1934

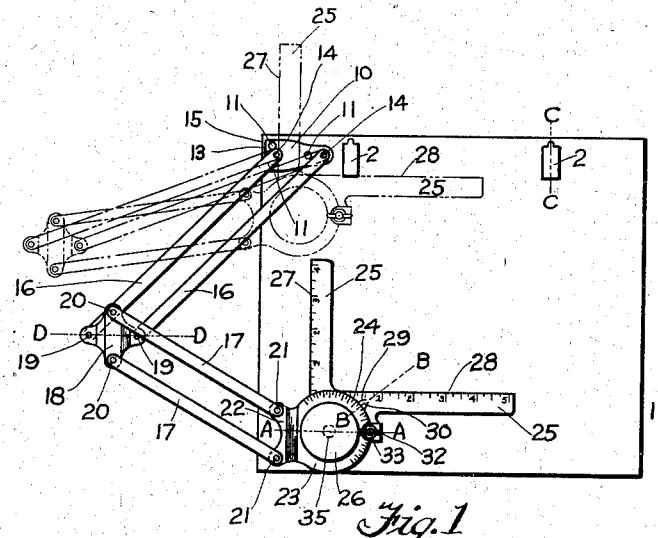


Fig. 1

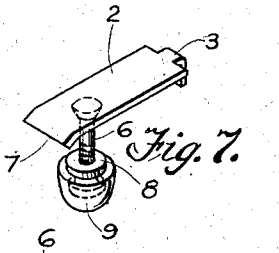


Fig. 7.

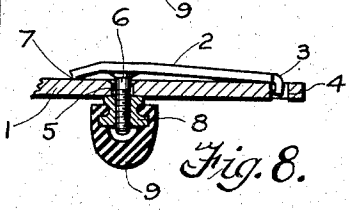


Fig. 8.

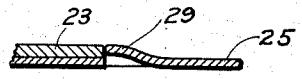


Fig. 5.

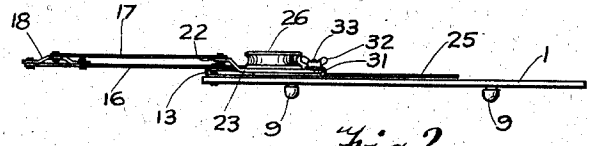


Fig. 2.

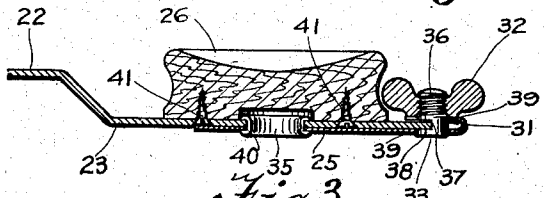


Fig. 3.

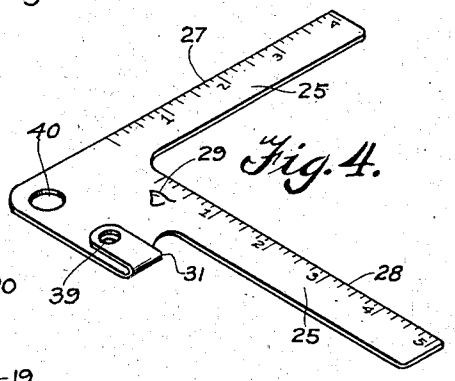


Fig. 4.

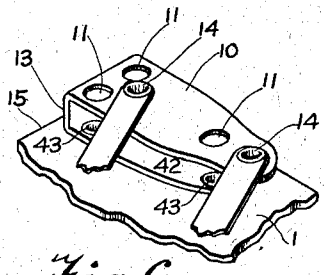


Fig. 6.

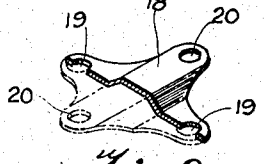


Fig. 9.

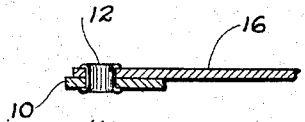


Fig. 11.

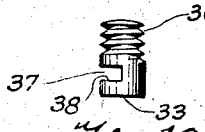


Fig. 10.

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DRAFTING DEVICE

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Application June 18, 1934, Serial No. 731,068

6 Claims. (Cl. 33—79)

This invention relates to apparatus for facilitating mechanical drafting operations, and more particularly is concerned with improved mechanisms whereby lines can be drawn at any desired angle or angles on sheet material.

The general object of the invention is to provide a relatively inexpensive drawing mechanism of such simple design and construction that the process of drawing becomes simplified.

A further object is to provide an apparatus of the indicated character which includes a simple protractor unit consisting of a vertical scale or ruling edge and a horizontal scale or ruling edge, a protractor, a lock clamp for locking the scales or ruling edges at any angle, a knob to facilitate the movement of said protractor unit to any desired position on the board, and a conventional paralleling mechanism, attached to a board or drawing surface, to keep the ruling edges always parallel to a line or group of lines.

A further object is to provide an apparatus of this character in which the vertical and horizontal scales or ruling edges and the bracket for the locking clamp are all stamped or cut from a single piece, thereby insuring that the ruling edges are always in the same relation to each other, as well as simplifying the cost of manufacture.

A further object is to provide a simplified and positive type of locking clamp adapted to lock the scales or ruling edges at any definite angle in relation to the protractor. This locking clamp grips the outer edge of the protractor in such a manner as to prevent the movement or slippage of the ruling edges from any angle at which they might be set.

A further object is to provide a construction of this character in which an eyelet is used to fasten the scale unit to the protractor so that the eyelet functions as a bearing on which the scale unit may rotate to any desired angular position as indicated by the marking on the outer edge of the protractor.

A further object is to provide apparatus of the stated character in which the protractor is circular on one side, concentric with the bearing on which the scale unit rotates, has lines or markings indicating equal divisions of a circle converging toward the center of the bearing from the outer edge of the circular side of the protractor, with one side of the protractor being extended to form an anchorage for the paralleling levers.

A further object is to provide a construction of this character in which a knob is fastened to the top side of the protractor, having a shape and size that will permit its use for moving the entire protractor head from one position to another on the board.

A further object is to provide a construction of this character in which a paralleling mechanism is attached to the protractor head and to the board in such a manner as to insure the ruling edges being kept parallel at all times and at any position on the board.

A further object is to provide a construction of this character in which a U-shaped bracket is used to fasten the paralleling mechanism to the top left-hand corner of the board, with its closed side at the edge of the board in such a manner as to allow the vertical ruling edge to pass under the top side of the bracket, thereby reaching all sections of the board.

A further object is to provide a construction of this character in which paper clamps are attached to the board in such a manner as to clamp securely either a single sheet of paper or an entire pad by tightening rubber covered nuts against the bottom of the board thereby pulling the clamps down on to the paper.

A further object is to provide a mechanical drafting mechanism having means operable from beneath the board instead of from above for securing paper to the board thereby permitting the vertical scale or ruling edge to pass over the paper clamps giving the ruling edges free access to any part of the drawing paper which is held by these clamps.

A further object is to provide a construction of this character in which rubber covered paper clamping nuts, extending beneath the board, act as feet or pads to support or tilt the back side of the board thereby allowing better vision when locating the ruling edges for drawing.

Other objects will appear in the course of the following description.

Referring to the accompanying drawing which illustrates one practical construction of our invention, Fig. 1 is a plan view of the drawing board and mechanism; Fig. 2 is a front elevation of the drawing board and mechanism; Fig. 3 a vertical section of the protractor unit taken on line A—A of Fig. 1; Fig. 4 the combination scale unit in perspective disassembled from the protractor; Fig. 5 a vertical section taken through line B—B of Fig. 1; Fig. 6 shows the U-shaped bracket in perspective, by means of which the mechanism is attached to the board; Fig. 7 a perspective view of the assembled paper clamping unit; Fig. 8 the vertical section of paper

clamping unit taken on line C—C of Fig. 1; Fig. 9 the center piece member showing a perspective section taken on line D—D of Fig. 1; Fig. 10 a disassembled view of the clamping bolt; and Fig. 11 a fragmentary vertical section taken through a joint of the paralleling mechanism.

Referring to the accompanying drawing which illustrates one typical embodiment of our invention:

In Fig. 1, the drawing surface or board 1, the paper clamps 2, the bracket 10, the long levers 16, 16, the center piece 18, the short levers 17, 17, the protractor head 23, 25, 26, 33, the combination scales 25, and the locking clamp 32, 33, constitute the essentials of the apparatus.

In Fig. 3 we show a vertical section of the protractor unit taken on line A—A Fig. 1, in which 23 is the protractor with equal divisions of a circle scribed around a portion of its outer edge 24 which is concentric with bearing 35, as shown in Fig. 1.

The combination scale unit 25 shown, in perspective in Fig. 4 is attached to the protractor 23 by means of an eyelet 35 which serves as a bearing between the protractor 23 and the combination scale 25 and permits the combination scale 25 to be rotated to any angular position in relation to protractor 23. The eyelet 35 serves both as a bearing and to hold protractor 23 and combination scale 25 together.

The protractor 22, 23, 24 is stamped or cut from a single piece of material, which is ordinarily relatively thin but strong metal. The outer edge 24 of the protractor 23 forms a perfect circle which is concentric to the bearing 35, but is extended and offset on one side to form the anchorage 22 to which the levers 17, 17 are attached. The circular side 24 is scribed, marked, or indented with lines indicating equal divisions of a circle and converging toward the center of the bearing 35.

Knob 26, as best seen in Fig. 3, is fastened directly to the protractor 23 by means of screws 41 and is used to facilitate the movement of the protractor head to any position on the board, the ruling edges being part of the protractor head, as hereinafter described.

The combination scale unit 25, as seen in Fig. 4, is cut or stamped from a single piece of thin strong material, such as metal, and has a vertical ruling edge 27 and a horizontal ruling edge 28 at right angles to each other, a bearing hole 40, and a clamp bracket 31 which is bent in a U-shape with sufficient opening to admit the edge of the protractor 23. A hole 39 is machined through both sides of clamp bracket 31 of proper size to admit clamp bolt 33 (as shown in Fig. 3) to sufficient depth, so that the shoulder 38 will come into locking engagement with the edge of protractor 23.

The locking clamp bolt 33, best shown in Fig. 3, (also shown in detail in Fig. 10) is made of a piece of bar stock with slot 37 wide enough to admit the edge of the protractor 23 and milled to sufficient depth so that the shoulder 38 will lock the protractor 23 against the inner side of the clamp bracket 31 when assembled. The locking clamp bolt 33 is threaded on the end 36 (Figs. 3 and 10) to take clamping nut 32 which screws down against the upper half of the clamp bracket 31 thereby locking the protractor edge between the shoulder 38 of clamp bolt 33 and the inner side of the clamp bracket 31. Loosening the nut 32 allows the protractor edge 24 to slip freely through slot 37, as illustrated in Fig. 3.

The spaced relation 39 with bearing 35 is such that the edge 24 of the protractor 23 always rests in the slot 37 (as illustrated in Fig. 3) of the clamp bolt 33 and thereby prevents the clamp bolt 33 from rotating.

The metal in the combination scale 25, Fig. 4, is raised or offset at 29 so that the top of the rise will be flush or even with the top of the protractor 23 (as shown in Fig. 5) when the combination scale 25 and the protractor 23 are assembled, as shown in Fig. 3, Fig. 1 and Fig. 5. The inner edge of the rise 29 is in the proper spaced relation to the bearing hole 40 so as to clear the outer edge of the protractor 23 when the combination scale 25 and the protractor 23 are assembled (see Fig. 5). The top of the rise is provided with a single line or mark 30 (see Fig. 1) which serves as a guide for locating the combination scales 25 at any desired angle in relation to the protractor 23 when the combination scales 25 are rotated on bearing 35. By making the division marks on the protractor as degrees of a circle, it will be recognized that the combination scales 25 can be set at any angle in degrees or other equal divisions of a circle. The rise 29, as shown in Fig. 1, Fig. 4 and Fig. 5, eliminates an extra piece of material and reduces construction costs.

The paralleling mechanism shown in Fig. 1 consists of two levers 17, 17 of equal length which are pivotally fastened at one end to the extended side 22 of the protractor 23. The opposite ends of the levers 17, 17 are pivotally fastened to the center piece 18. The center piece 18 (Fig. 9) is so constructed that it has two pairs of holes 19, 19 and 20, 20, the center lines of which are at right angles to each other. Each pair of holes is on a different plane so that the levers 17, 17 attached to the holes 20, 20 do not interfere with the levers 16, 16 which are attached to holes 19, 19, as shown in Fig. 1. Fig. 9 shows the center piece 18 in perspective, but cut on line D—D of Fig. 1, and aptly illustrates the manner in which it is bent or formed to put holes 19, 19 on a different plane than holes 20, 20.

The levers 16, 16 are pivotally attached to the holes 19, 19 in the center piece 18, and the opposite ends of the levers are fastened to holes 14, 14 in the bracket 10, it in turn being fastened to board 1, as for example, in the upper left-hand corner 15 by suitable means, such as eyelets 43 (see Fig. 6).

The means for providing bearings between the protractor 23 and levers 17, 17, center piece 18 and levers 16, 16, and the bracket 10 and levers 16, 16 forms an important part of our inventive concept. We have found that eyelets 12, as illustrated in Fig. 11, provide an inexpensive but rugged bearing which is substantially free of wear and play even after long use of the apparatus which is essential to the accuracy thereof.

The U-shaped bracket 10, as shown in Fig. 1 and Fig. 6, is used to attach the paralleling mechanism to the board 1 and is assembled with the closed side 13 toward the outer edge 15 of the board 1. This permits the vertical scale or ruling edge 27 to be used close to the edge 15 at the top of the board 1 as is shown in broken lines in Fig. 1 before being stopped by the closed side 13 of bracket 10.

The bracket 10, as above stated, is secured to the board by means of eyelets 43 which extend through the lower side 42 of the bracket and into the board 1. Holes 11 may be provided in the upper arm of the bracket over the eyelets 43 which holes are of sufficient size to admit a punch or

eyelet set or other assembly tool. Holes 14 in the bracket 10 are used to attach the paralleling mechanism to the bracket by eyelets 12, as will be understood.

In Fig. 8 the paper clamp 2 is shown in vertical section taken on line C—C of Fig. 1. Clamp 2 is stamped or cut from a single piece of material, such as thin strong metal, with the small projection 3 bent down at right angles to provide an anchor when inserted in a hole 4 in the board 1, (see Fig. 8) thus keeping the clamp 2 from turning when being tightened or loosened.

A clamp screw 6 is attached to the bottom of the clamp 2 in the same spaced relation to the anchoring projection 3 as a hole 5 provided in the board 1 is to the hole 4. Thus when assembled, the projection 3 drops into the hole 4 and screw 6 passes through the hole 5 (see Fig. 8). The screw 6 is of sufficient length to extend through the board 1 and receives a clamping nut 8 which can be screwed up against the bottom of the board 1 to produce a gripping action at edge 7 for holding either a single sheet of paper, an entire pad of paper, or other material on which lines are to be drawn.

The nut 8, as shown in Fig. 8, has a rubber covering or pad 9 which serves as a foot or support for the board, as will be clearly seen in Fig. 2. These feet or pads 9 also prevent the clamp nuts from marring or scratching any surface upon which the board might be laid.

Fig. 7 shows a perspective view of clamp 2 and shows more clearly the form and assembly of the unit.

While in accordance with the patent statutes one embodiment of our invention has been illustrated and described in detail, it should be understood that our invention is not limited thereto or thereby but is defined in the appended claims.

We claim:

1. Apparatus of the character described comprising a protractor unit, a bracket adapted to be mounted, for example, on a drawing board, a pair of levers connected pivotally to the bracket, a second pair of levers connected pivotally to the unit, a centerpiece formed with offset portions so that the two bearing holes for one pair of levers come on a different plane to a second pair of bearing holes, and means pivotally securing the levers to the centerpiece.

2. A parallel linkage type of drafting mechanism including a U-shaped bracket to be used to attach the mechanism to a drawing board, said bracket having two or more holes in the bottom side for attaching to the board and having an equal number of holes through the top side in line with the holes in the bottom side through which a punch or other assembly tool may be used, and two additional holes in the top side to which the mechanism is attached.

3. In combination, a drafting board, a vertical scale, and linkage means for adjustably mounting the scale on the board including a U-shaped bracket so situated in the upper left hand corner of the drawing board with its closed side on the outer left edge so that it will admit the vertical scale into its open side and thus permit the scale to be moved over substantially the entire surface of the board.

4. Drafting apparatus including a protractor unit having a scale arm, a bracket adapted to be secured to a drafting board and having an arm portion spaced in parallel relation with such a board, parallel linkage, means pivotally securing the linkage to the protractor unit, and means pivotally securing the other end of the linkage to the arm portion of the bracket so as to allow the scale arm of the protractor unit to be moved between the arm portion of the bracket and the board to which the bracket may be secured.

5. In combination, a one piece square having a hole therethrough, a disc having a hole therethrough, a sleeve eyelet extending through the holes and having its ends crimped outwardly to pivotally secure the square to the disc, protractor markings associated with the square and disc, means for locking the square in any desired angular relation with the disc, a U-shaped bracket having one leg portion adapted to be secured to a board and another leg adapted to be held in spaced relation to the first leg, parallel linkage, and sleeve eyelets securing the linkage to the disc and to the last-named leg of the bracket whereby the square can be moved to and from the bracket without changing the angular relation of the square and the bracket.

6. In combination, a one piece square, a disc, means pivotally securing the square to the disc, protractor markings associated with the square and disc, means for locking the square in any desired angular relation with the disc, a U-shaped bracket having one leg portion adapted to be secured to a board and another leg adapted to be held in spaced relation to the first leg, and means securing the disc to the last-named leg of the bracket so that the disc may be moved to and from the bracket without changing the angular relation of the disc and bracket and so the square can be moved between the legs of the bracket.

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