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D. W. BAUMBACH  
PORTABLE DRAFTING MACHINE

2,915,828

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FIG. 1.

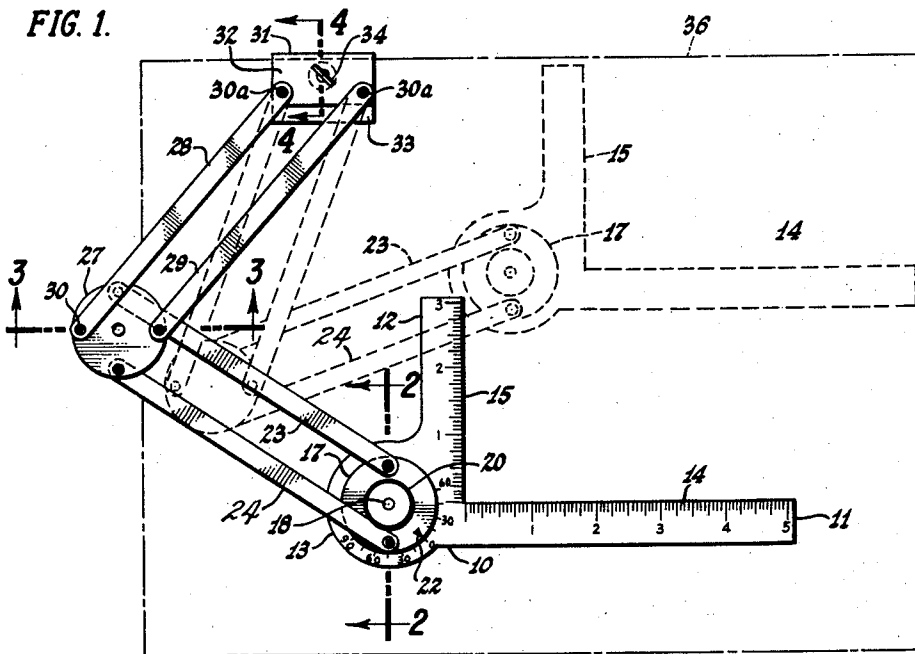


FIG. 2.

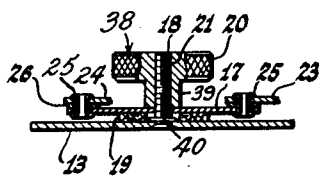


FIG. 3.

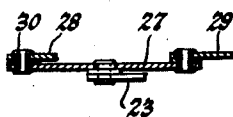


FIG. 4.

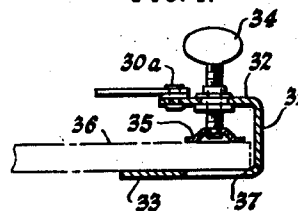
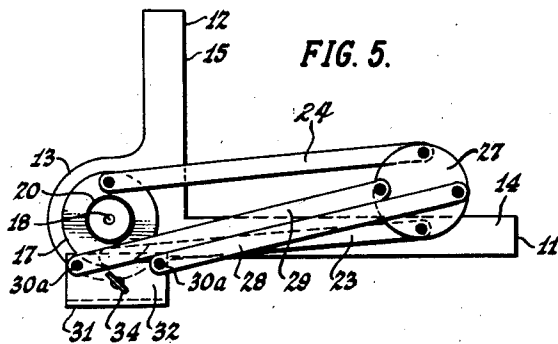


FIG. 5.



Darrel W. Baumbach,  
INVENTOR.

BY

R. E. Beaugue

ATTORNEY.

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## PORTABLE DRAFTING MACHINE

Darrel W. Baumbach, Pacoima, Calif., assignor to  
David D. Miller, Los Angeles, Calif.

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1 Claim. (Cl. 33—79)

The present invention relates to drafting instruments and more particularly to a compact drafting machine which is accurately calibrated and sturdily constructed for a variety of uses.

In the drafting field, as well as others, it has been common practice to employ a plurality of drafting instruments such as individual T-squares, rulers, triangles, protractors, etc. for use in preparing drawings and sketches. For most engineering purposes, a measurement scale or indicia such as a succession or progression of steps or degrees is provided along the edges of the instruments. Furthermore, apparatus commonly referred to as a drafting machine is employed to achieve suitable drawings and sketches easily and rapidly with a minimum of instruments and effort. To accomplish this, a conventional drafting machine usually includes a straight edge ruler joined with a protractor and pivotally carried by a flexible arm. One end of the arm is generally adapted to be fastened to a member such as a drawing board carrying a drawing medium as paper for example. The fastening point serves as a reference about which the ruler and protractor may be positioned. Employment of such an arrangement permits the straight edge ruler to be adjusted to a desired position, either coincident with the horizontal axis of the paper or angular to the horizontal in accordance with the indicia of the protractor, and secured with respect to the drawing paper so that the ruler may be subsequently positioned about the drawing paper without disturbing the angular relationship established between the ruler and drawing paper.

A drafting machine as described above generally employs a wire and pulley mechanism to achieve flexibility of the arm in order to position the ruler with respect to the drawing paper. Also, a spring tension means is generally provided to maintain a constant torque on the rotatable joints of the arm to provide a firm but movable relationship. Because of these various mechanisms, it is expensive to construct such a drafting machine, and maintenance is a growing problem. In general, these machines are not suitable for portable use and are usually securely fastened to the drafting board as a permanent fixture.

Therefore, a need has existed for a portable drafting machine capable of being easily attached to and detached from the drafting board which can be carried about in a user's coat pocket or brief case, for example. A drafting machine of this character should be of simple construction, not susceptible to breakdown requiring maintenance or repairs and should be relatively inexpensive to construct as compared to conventional drafting machines so that the drafting machine may be easily replaced.

Accordingly, the present invention provides a drafting machine which is simple in construction; portable and inexpensive. In one form of the invention, an indicia plate is provided having at least one straight edge serving as a ruler and a semi-circular portion representing a

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protractor. A pair of discs and a first and second arm means is employed to flexibly support the indicia plate whereby the indicia plate may be positioned relative to the surface of the drawing paper. A feature resides in the fact that the arm means are secured to the discs in a fashion which achieves freedom of arm means movement without interference between the first and second arm means.

It is an object of the present invention to provide a novel drafting machine capable of positioning a ruler having a selected angle parallel to the surface of a drawing medium without affecting the angular relationship of the ruler with the medium.

It is another object of the present invention to provide a drafting machine which is easily fastened to a drawing board, conveniently detachable therefrom and readily collapsible for carrying purposes.

Another object is to provide a simple means for attaching the flexible arms of a drafting machine to a straight ruler having a predetermined angle whereby the arms may be moved without upsetting the ruler angle.

Other objects and advantages of the present invention will become apparent to those skilled in the art after reading the following description taken together with the accompanying drawings, in which:

Figure 1 is a front view of the present invention illustrating a drafting machine carried on a drafting board;

Figure 2 is a section view taken along line 2—2 of Figure 1 showing the attachment of one pair of arms to a disc and indicia plate;

Figure 3 is a sectional view taken along line 3—3 of Figure 1 showing each pair of arms attached to a common disc;

Figure 4 is a sectional view taken along line 4—4 of Figure 1 illustrating the clamping means for securing the drafting machine to the drafting board; and

Figure 5 is a front view of the drafting machine of the present invention shown in a folded configuration for convenient storage or transportability.

Referring to the drafting machine shown in Figure 1, an indicia plate 10 is configured to form a pair of rulers 11 and 12 disposed at right angles to each other and having a semi-circular portion 13 integrally formed therewith. The pair of rulers are provided with markings corresponding to inches, and increments thereof, along straight edges 14 and 15 associated with rulers 11 and 12 respectively while the semi-circular portion is provided with markings representing increments of degrees ranging from zero to 90 degrees in increments of 15 degrees. Zero degrees is indicated on the semi-circular portion equidistant from straight edges 14 and 15. The location of the indicia is accurately determined during construction and may be set out by scribing a line at each increment followed by painting or other suitable visual means of indication. An indicia plate constructed in this configuration offers the combination of vertical and horizontal rulers with a protractor so that the rulers may be properly set at a variety of angles without requiring additional instruments. An indicator disc 17 is carried by the semi-circular portion which has a screw or bolt 18 extending through the center of the semi-circular portion and disc 17 as shown in Figure 2. A resilient washer 19 is provided between the disc and semi-circular portion 13 so that a nut 38 having knob 20 rotatable about threads 21 provided on the bolt may be tightened to achieve a locking condition between the disc and indicia plate. In the present instance, a washer composed of cork is employed.

It will be noted from an examination of Figure 2 that the nut 38 in addition to the annular knob 20 also includes an axially extending shank 39 which is adapted to bear upon the disc 17 to produce the locking of the disc 17

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to semi-circular portion 13 in fixed relation. It will be noted that bolt 18 includes a spacer 40 positioned between the semi-circular portion 13 and the disc 17 within the annular space between the bolt 18 and the hole in the center of the annular compressible resilient washer 19. As shown in Figure 2, this shank portion 39 of the nut has a diameter which is not in excess of the hole in the resilient washer 19, and this washer has a thickness greater than the thickness of the spacer 40. Furthermore, as shown, the resilient washer is arranged with its upper face in coplanar frictional engagement with the indicator disc 17 and its lower face in coplanar frictional engagement with the semi-circular portion 13. This structure provides for frictionally locking the semi-circular portion 13 to the disc 17 when the nut is tightened on the bolt, with an inherently even distribution of pressure throughout the surface of the washer and provides positive locking without undue wear on the resilient locking washer.

Disc 17 is provided with a marker 22 so that when the indicia plate is rotated to place the marker in alignment with a particular degree indicated on the semi-circular portion, straight edge 14 of ruler 11 will assume that particular angular relationship with respect to zero degrees indicated on the semi-circular portion.

Attached to indicator disc 17 at points approximately 180° apart is a pair of arms 23 and 24. These arms are rotatably carried on the disc opposite to the side adjacent washer 19 by means of rivets 25 and brass washers 26. The pair of arms are located on the same side as marker 22 and are disposed equi-distant therefrom.

The ends of arms 23 and 24 opposite to the ends connected to the indicator disc 17 are attached to a disc 27 in a manner similar to the connection to disc 17. As shown in Figure 3, the first pair of arms 23 and 24 is attached to one side of disc 27 while a second pair of arms 28 and 29 are attached to the opposite side of disc 27 at points disposed 180° apart and 90° apart from each of the first pair of arms. In this manner, attachment of the four arms is located on the disc along the central horizontal and central vertical axes of the disc. A plurality of rivets, such as rivet 30, is employed to secure the ends of the arms to the disc.

The ends of the second pair of arms 28 and 29 opposite to the ends connected to disc 27 are attached to a clamping means by rivets 30a as shown in Figure 4, comprising a U-shaped member 31 having a pair of legs 32 and 33. A winged screw 34 threadably engaged with leg 32 may be rotated counterclockwise so that a cup portion 35 carried on the end of the screw engages a surface of a drawing medium support such as a drawing board 36. By tightening screw 34, the drafting board will be firmly attached between cup 35 and leg 33 of the clamping means and indicia plate 10 movably carried by the clamping means via the first and second pair of arms. An aperture 37 is provided in leg 33 for conveniently achieving the attachment of cup 35 to the end of wing screw 34.

It is important to note that the connection of arms 22 and 23 to discs 17 and 27, respectively, lie in substantially the same plane as the central vertical axis of each disc while the connection of arms 28 and 29 to disc 27 and U-shaped member 31, respectively, lie in substantially the same plane as the central horizontal axis of disc 27. This relationship will not change when the indicia plate is positioned about the surface of the drafting board and furthermore, this relationship maintains each arm of each pair parallel to the other arm of the same pair. In this manner of construction, the pairs of arms may be moved without interference from each other.

In actual operation, the drafting machine in the present invention may be unfolded and attached to a support such as drawing board 36 by fitting the U-shaped member 31 into engagement with the drawing board. Winged screw 34 may be rotated so that cup 35 engages with the top surface of the drawing board which causes the drawing

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board to be firmly clamped between leg 33 and cup 35. If it is desirable to draw straight horizontal or vertical lines, the indicia plate may be rotated so that marker 22 on disc 17 aligns with zero degrees visibly on the semi-circular portion 13 of the indicia plate. A marking instrument such as a pencil (not shown) may be held adjacent either of the rulers and drawn adjacent their respective straight edges to provide either a vertical or horizontal line on a marking medium such as paper carried by the drafting board. Should an angular line be desired, knob 20 may be rotated to loosen the indicia plate and permit its rotation so that marker 22 may be aligned with the degree of angle desired. At this time, knob 20 may be rotated to tighten the relationship between the indicator disc 17 and the indicia plate 10 so that further indicia plate rotation is prohibited. In this manner, straight edge 14 associated with ruler 11 will assume the angle indicated by marker 22. The backing off of knob 20 from its tightened position is restricted by the resilient composition of washer 19. Once the relationship between the indicator disc and the indicia plate has been established by the tightening of knob 20, the indicia plate may be positioned parallel to the surface of the paper and drawing board without upsetting the angular relationship. This is illustrated in Figure 1 by the employment of dotted lines to show the indicia plate 10 and the first and second pairs of arms in another position. During the positioning of the indicia plate parallel to the paper, the first and second pairs of arms rotate on common disc 27, indicator disc 17, and the clamping means, respectively.

As shown in Figure 5, the drafting machine may be detached from the drawing board 36 and readily adjusted in a folding relationship to provide a small, compact unit transportable in a coat pocket or brief case.

In order to provide protective coating against environmental conditions, it has been found desirable to anodize all parts of the drafting machine except for the screws, washers and rivets which may be composed of suitable materials such as steel or brass.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of my invention, and, hence, I do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claim.

I claim:

A drafting machine comprising, an indicia plate having a straight edge adapted to be used with a drawing surface member and having a semi-circular portion integrally formed therewith; a plurality of marks on said indicia plate associated with the straight edge and the semi-circular portion and corresponding to increments of inches and degrees respectively; a clamping means for supporting the drafting machine and securing it in position comprising, a clamping bracket member and a winged fastening screw extending therethrough; a first pair of parallel arms; means pivotally securing an end of each of said first pair of parallel arms to said clamping member; a second pair of parallel arms; a flat circular indicator disc having a marker associated with the increments of degree marks on said semi-circular portion; means pivotally securing an end of each of said second pair of parallel arms to said indicator disc; position adjusting and locking means for variably setting said indicia plate whereby said straight edge may be set at a particular angle indicated by the degree marks on the semi-circular portion relative to said indicator disc marker comprising, a bolt extending through said semi-circular portion, a flat washer disc of resilient composition having a central hole therethrough and arranged around said bolt with one face thereof in coplanar frictional engagement with said indicator disc and the other face thereof in coplanar frictional engagement with said semi-circular portion, a spacer around said bolt and within said washer central hole positioned between said semi-circular por-

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tion and said indicator disc and being of lesser thickness than said resilient washer to allow for compression of said washer between said indicator disc and said semi-circular portion, an adjusting nut having an axially extending shank of a diameter not exceeding that of said washer central hole and arranged in threaded engagement with said bolt for drawing an end of said shank into frictional engagement with said indicator disc over said spacer whereby said resilient washer is compressed to lock said semi-circular portion and said straight edge in position relative to said indicator disc and to said second pair of parallel arms; and a flat common disc pivotally connecting said first and second pairs of arms in respective parallel paired relationships whereby said indicia plate is positionable relative to said clamping means while maintaining the particular angular relationship of said straight edge indicated by said indicator disc marker on the angle marks on said semi-circular portion.

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