Jan. 2, 1923.

L. B. HASBROUCK ET AL.
DRAWING APPARATUS.
FILED NOV. 26, 1920.

1,440,993

2 SHEETS-SHEET 1

Fig. 1

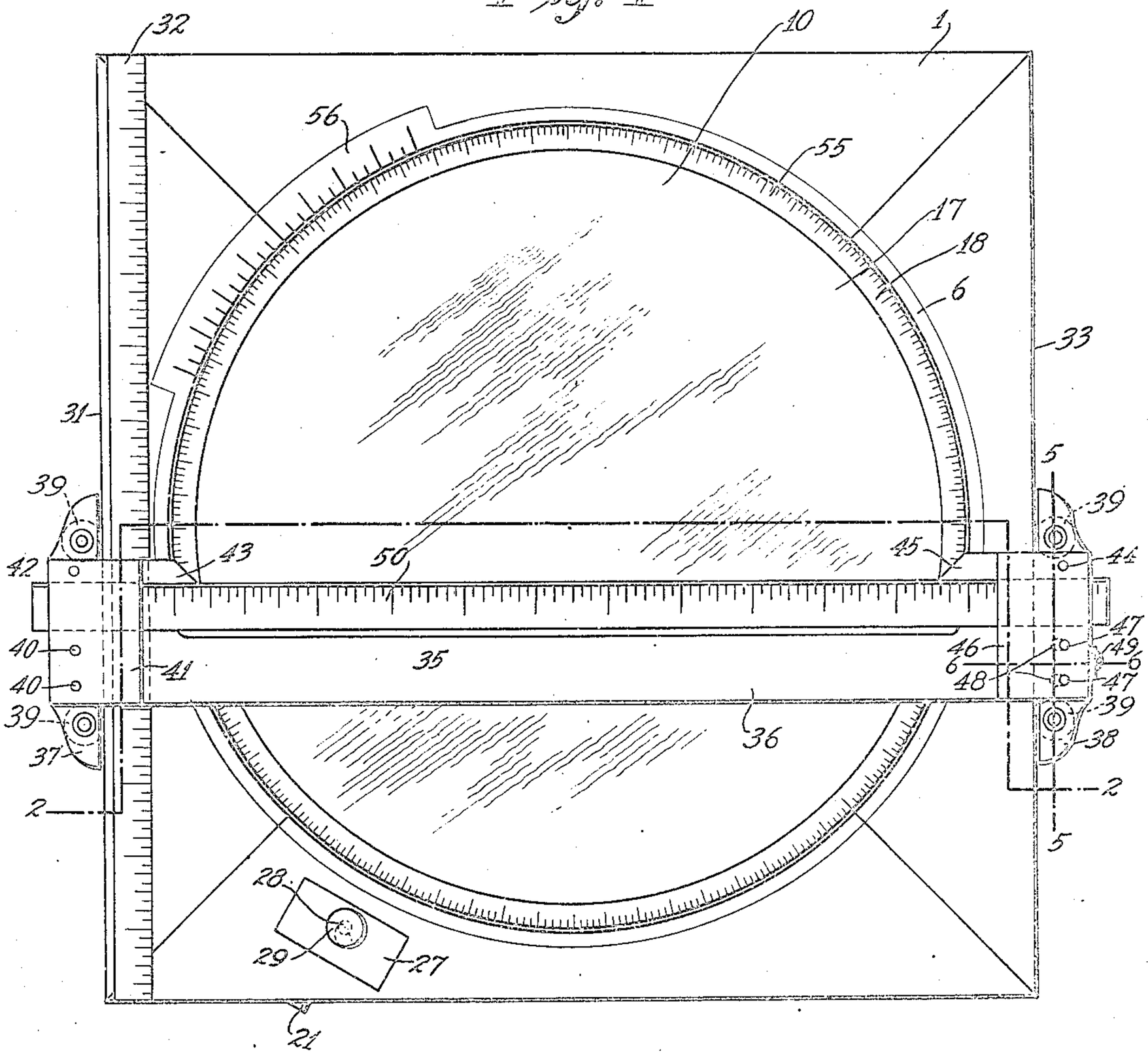
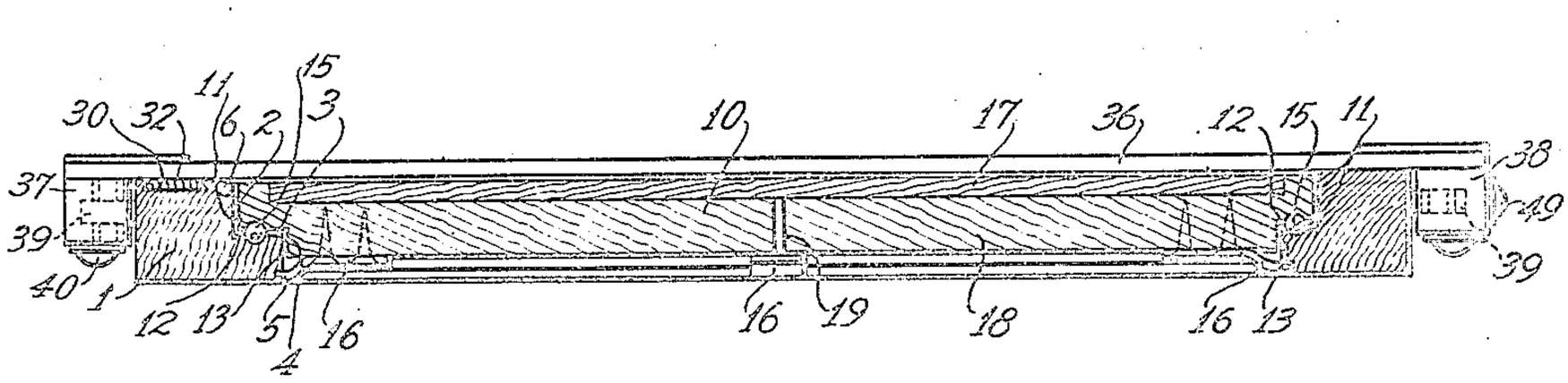


Fig. 2



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2 SHEETS-SHEET 2

Fig. 3

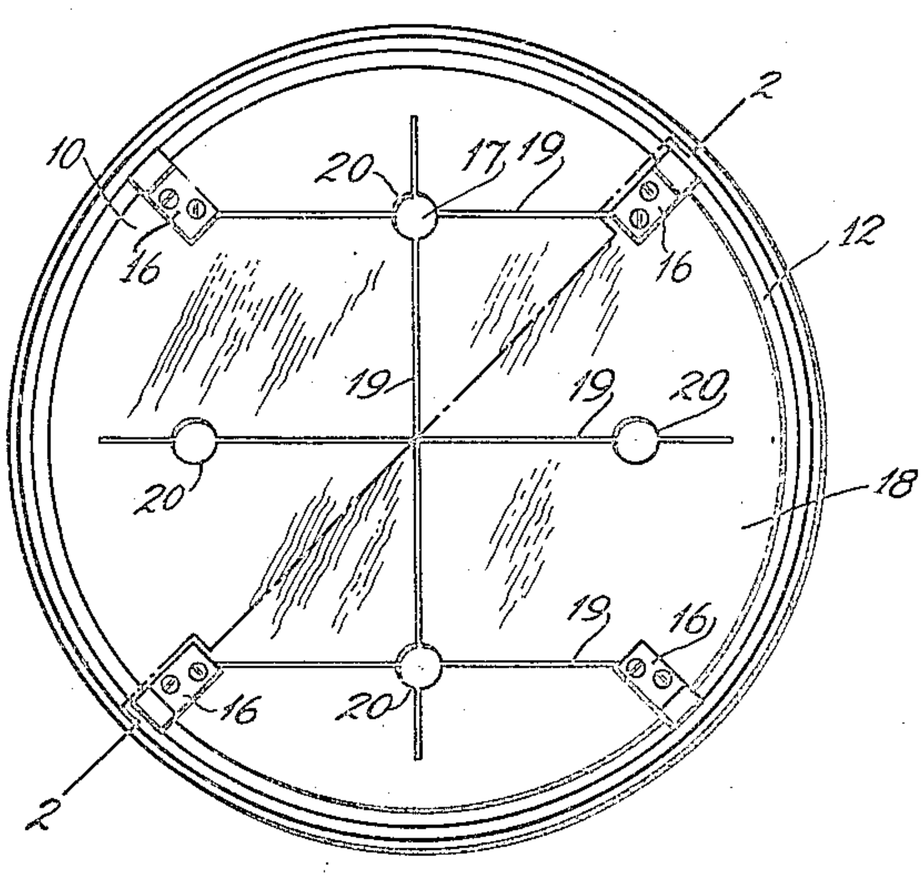


Fig. 4

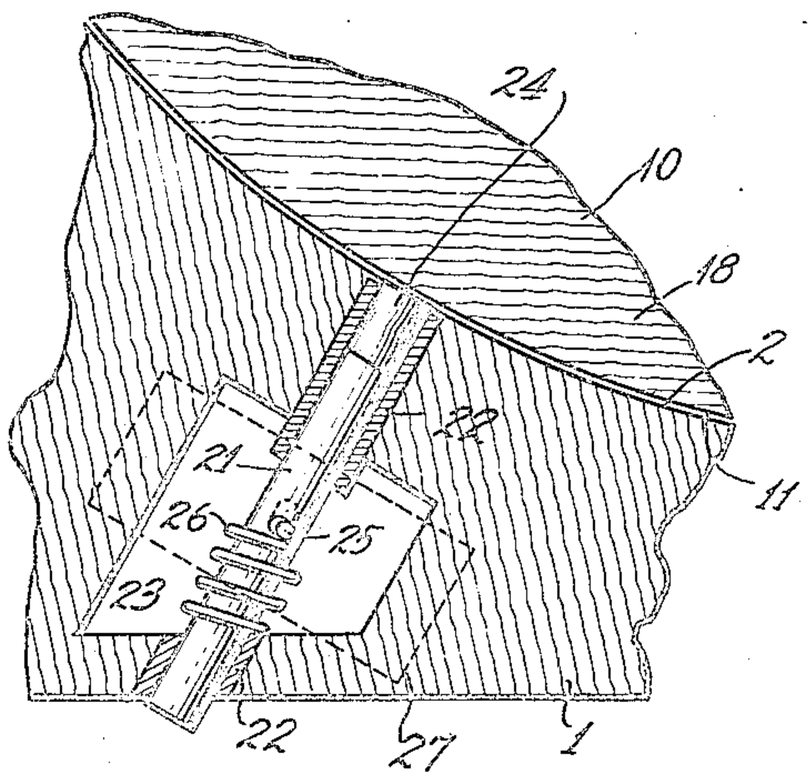
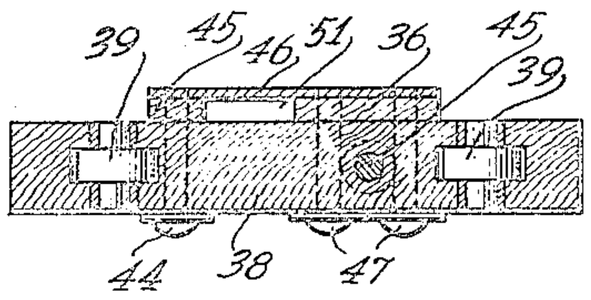


Fig. 5



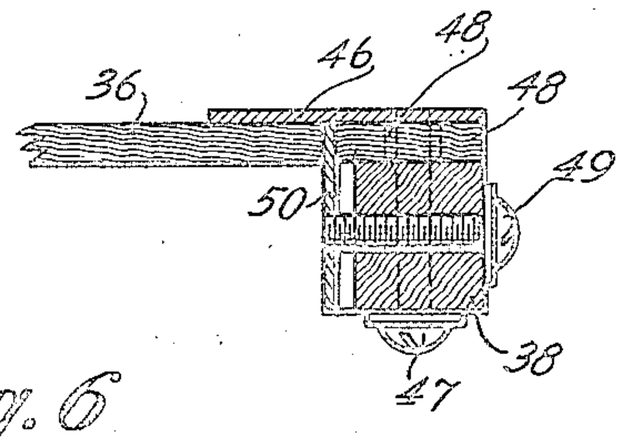


Fig. 6

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UNITED STATES PATENT OFFICE.

LOUIS B. HASBROUCK AND HENRY E. VAN NESS, OF ELMIRA, NEW YORK.

DRAWING APPARATUS.

Application filed November 26, 1920. Serial No. 426,355.

To all whom it may concern:

Be it known that we, LOUIS B. HASBROUCK and HENRY E. VAN NESS, citizens of the United States, both residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Drawing Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to apparatus for making mechanical and architectural drawings.

An object of the invention is to provide a simple and inexpensive apparatus by means of which lines may be drawn quickly, easily, and accurately in all directions at measured angles and measured distances. The apparatus thus takes the place of an ordinary drawing board, a T-square, triangles, protractors and scales.

In accordance with the invention a circular drawing board is mounted in the frame by a bearing near the edge of the board which is arranged to prevent relative lateral movement of the board and frame and so retain the board centered in the frame, while permitting free rotative movement of the board in the frame. On the frame are mounted two scales, one of which is free to move transversely across the drawing board while being retained always at a fixed angle to the other scale.

A further feature of the invention consists in providing a carriage for the transversely movable scale which may be adjusted so as to fit the frame regardless of external expansion or shrinkage of the frame.

Other features and advantages of the invention will be pointed out in connection with a detailed description of the apparatus embodying the invention which is illustrated in the accompanying drawings, in which—

Fig. 1 is a plan view of a complete apparatus;

Fig. 2 is a sectional elevation of the apparatus taken upon the line 2—2 of Fig. 1 and the line 2—2 of Fig. 3;

Fig. 3 is a bottom view of the circular drawing board;

Fig. 4 is a fragmentary horizontal section showing the brake;

Fig. 5 is a transverse section of the carriage taken upon the line 5—5 of Fig. 1; and

Fig. 6 is a fragmentary longitudinal section of the carriage taken upon the line 6—6 of Fig. 1.

The frame 1 may conveniently be made of four pieces of wood mortised and joined at the corners of the frame as shown in Fig. 1. The inner edge of the frame is circular and comprises an upper cylindrical portion 2, a horizontal ledge 3 and a lower cylindrical portion 4. At the lower edge of the portion 4 is an annular groove 5. The surface of the upper side and frame 1 is slightly bevelled off around its inner edge at 6. The edge of the circular drawing board 10 has upper and lower cylindrical portions 11 and 13 between which is a horizontal portion 12. The cylindrical portions 11, 13 of the edge of the board 10 do not contact with the portions 2 and 4 of the edge of the frame. In the horizontal ledge 3 of the frame and the horizontal portion 12 of the board are opposite annular grooves or races in which are a series of balls 15 forming a ball bearing. The grooves or races are made deep. Most desirably they are made as deep as possible without bringing the horizontal surfaces 3 and 12 into actual contact, that is to say, they are each nearly semi-circular in cross section. Owing to the deepness of the grooves, the engagement of the balls 15 with the sides of the grooves prevents relative lateral movement between the frame 1 and the board 10, so that while the board may be freely rotated in the frame, it is retained centered with respect to the frame. When the board is supported in the frame by the balls 15, its upper surface lies in the plane of the lower edge of the bevel 6 upon the frame. After the balls and the board have been placed in position within the frame, metal tabs 16 are screwed to the under surface of the drawing board. The ends of these tabs engage the upper surface of the groove 5 in the frame and so prevent the removal of the drawing board from the frame. The outer ends of the tabs are slightly less in thickness than the groove 5, so that the tabs do not contact with the table or other surface on which the frame 1 is placed.

The circular drawing board 10 consists of two pieces. A thin upper piece 17 which provides the drawing surface is set into a lower piece 18 of greater thickness than the piece 17. The pieces 17 and 18 are joined by gluing. The piece 18 may contain a series of slots or cuts 19 (Fig. 3) to prevent warp-

ing of the board. The cuts 19 may conveniently be made by a scroll saw which may be inserted through holes 20 previously bored in the piece 18.

A brake is provided to retain the circular drawing board in any desired angular relation to the frame. The brake consists of a plunger 21 mounted in a bushing 22 in the frame 1 and extending across an aperture 23 in the frame opening at the under side of the frame. The plunger 21 is provided at its inner end with a friction piece 24 of fiber or other suitable material. In the plunger 21 is inserted a transverse pin 25 which projects upwardly from the plunger. A spiral spring 26 reacting between the pin 25 and the inner surface of the aperture 23 tends to push the plunger inwardly so that its friction member 24 engages the edge of the circular drawing board 10. Above the plunger 21 a piece of sheet metal 27 (a phantom view of which is shown in Fig. 4) is attached to the upper surface of the frame 1. The sheet 27 contains an aperture 28 extending longitudinally of the plunger 21 and having an offset portion extending transversely of the plunger. The pin 25 extends upwardly through the aperture 28 and is surmounted by a button or handle 29. By moving the button 29 outwardly and then slightly to the side so that the pin 25 engages the offset portion of the aperture 28, the end of the plunger 21 may be retained out of engagement with the drawing board 10. When the pin 25 is released the spring 26 urges the friction piece 24 of the plunger against the edge of the board and thus restrains the board against rotary movement relative to the frame. The side thrust between the board and the frame which is produced by the spring is borne by the engagement between the balls 15 and the sides of the grooves in which they are located, so that this thrust does not move the board laterally with respect to the frame or change its centering.

The outer edge of the upper surface of the drawing board 10 is provided with an angular scale 55. In order to insure the greatest possible accuracy in the angular setting of the board relative to the frame, a vernier scale 56 may be provided on the frame.

In a groove 30 extending across the frame 1 near one of its outer edges 31, and parallel to the edge 31 is seated a scale 32 which is capable of a longitudinal movement in the groove.

The transversely movable carriage 35 is mounted across the frame 1. The carriage 35 comprises a longitudinal member 36 extending completely across the frame 1 and beyond its outer edges, and two transverse pieces 37, 38. Each of the transverse pieces 37, 38 is provided with two rollers 39 which project slightly beyond its inner surface and are adapted to roll upon the parallel opposite outer edges 31, 33 of the frame 1. The transverse piece 37 is rigidly attached to the longitudinal member 35 by screws 40 which pass through the transverse piece 37, the longitudinal member 36, and have a threaded engagement with a piece of sheet metal 41 lying upon the upper side of the longitudinal member 36. A third screw 42 passes through the transverse piece 37 and through a guide piece 43 and has a threaded engagement with the piece 41.

The transverse piece 38 is attached to the longitudinal member 36 in such a way that its distance from the piece 37 may be varied to compensate for swelling or shrinking of the frame 1. The screw 44 passes through the transverse piece 38, the guide piece 45 and is in threaded engagement with the piece of sheet metal 46. The screws 47 pass through the transverse piece 38 and have a threaded engagement with the metal piece 46. These screws pass through elongated apertures 48 (Fig. 6) in the longitudinal member 36. A screw 49 passes through a horizontal hole in the transverse member 38 and has a threaded engagement with a metal projection 50 extending downwardly from the longitudinal member 36. By turning the screw 49, the transverse piece 38 with the guide piece 45 and the metal piece 46 may be drawn toward the extension 50 which is rigidly attached to the longitudinal member 36. In order to make the rollers of the transverse pieces 37, 38 engage the edges of the frame 1, therefore, it is merely necessary to tighten the screw 49 in dry weather and loosen the screw in damp weather.

A scale 50 is slidably mounted in the carriage 35 by being inserted in the apertures 51 (Fig. 5) provided between the longitudinal member 36 and the guide members 43, 45 and the transverse members 37, 38, and the metal pieces 41, 46 (Fig. 5). The longitudinal member 36 of the carriage 35, and the scale 50 rests upon the upper surface of the frame 1, and because of the bevel of the frame at 6 they are spaced from the upper surface of the drawing board 10 near its outer edge and do not come into contact with the central part of the board or the paper attached to it, unless pressed downwardly. The clearance thus provided has two advantages. It permits the heads of thumb tacks by which paper may be attached to the drawing board to pass under the carriage 35 and the scale 50. Furthermore, it prevents a smudging or blotting of the lines drawn upon paper attached to the board 10 in case the carriage and scale are passed over the lines. At the same time the edge of the scale 50 is sufficiently close to the paper

upon the drawing board 10 to permit accurate ruling and may if desired be pressed down against the paper.

In using the apparatus described, drawing paper is attached to the upper surface of the drawing board 10 by means of thumb tacks in the usual manner. Lines are then drawn upon the paper using the edge of the scale 50 as a ruler. In order to draw a line at any desired angle from a line already drawn, it is merely necessary to set the board and the carriage in such a position that the lines lies along the edge of the scale 50. The plunger 21 is then pulled back and the board 10 is rotated through the angle desired as indicated by the scales 55 and 56. The plunger 21 is then released so that the board is held fixed and any number of lines at the desired angle to the first line may be drawn by moving the carriage across the board and using the edge of the scale 50 as a ruler. The length of these lines may be measured by the scale 50 and their distance apart by readings of the scale 32. The fact that each of the scales is slidable longitudinally facilitates the readings by permitting the setting of a mark upon either scale against the position from which the reading is to be taken.

Many modifications may be made in the embodiment described without departing from my invention, and separate features of the invention may advantageously be used independently, but when all the features of the invention are used in combination they all cooperate to provide a simple unitary apparatus for facilitating the making of measured drawings.

What is claimed is:

1. Drawing apparatus, comprising an open frame having a circular inner edge and a horizontal ledge extending around said inner edge, a circular drawing board in said frame, and a ball bearing between said ledge and said drawing board serving as the sole support for said drawing board and serving to center said drawing board in said frame.

2. Drawing apparatus, comprising an open frame having a circular inner edge and a horizontal ledge extending around said inner edge, a circular drawing board in said frame, a ball bearing between the upper side of said ledge and the drawing board, and projections from said drawing board extending below the lower surface of said horizontal ledge and serving to prevent removing the drawing board from the frame.

3. Drawing apparatus, comprising a frame, a circular drawing board in said frame, a brake upon said frame adapted to engage said board, a spring tending to urge said brake toward said board, said frame and board having opposite annular grooves having a portion of their sides substantially vertical and balls in said grooves adapted by engagement with the sides of said grooves to prevent lateral movement of the board relative to the frame under the thrust produced by said spring.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

LOUIS B. HASBROUCK.
HENRY E. VAN NESS.

Witnesses:
S. C. HUNT,
F. S. PALMITER.