Sept. 19, 1939. W. J. ADAMS 2,173,526

PROTRACTOR

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FIG. 1

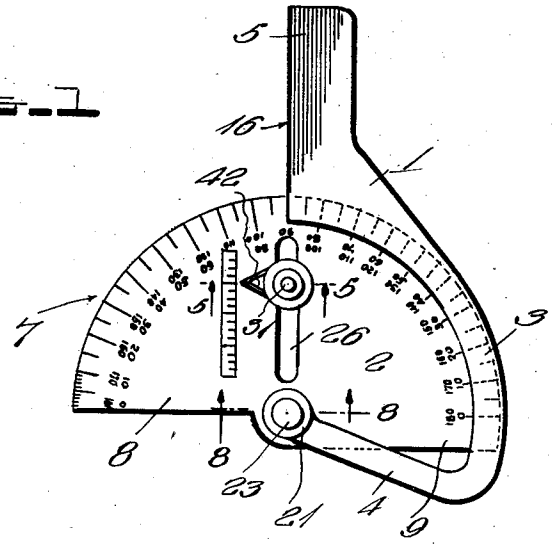


FIG. 2

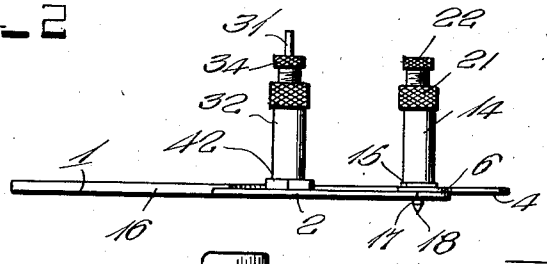


FIG. 3

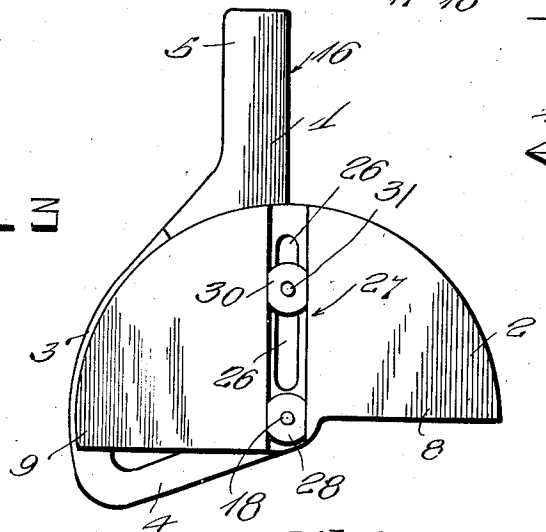
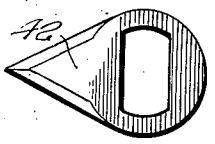


FIG. 12



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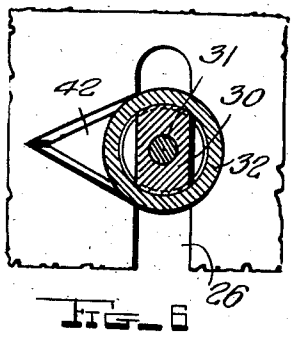


FIG. 6

FIG. 4

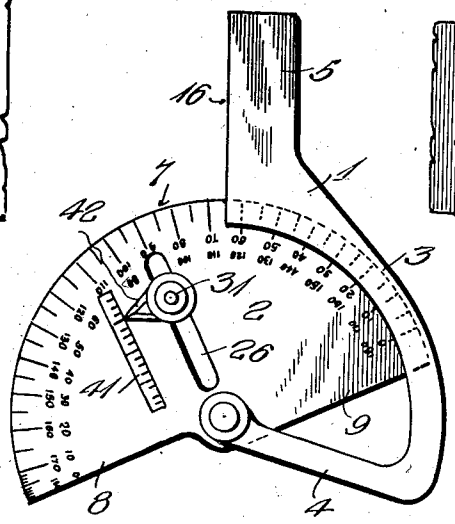


FIG. 11

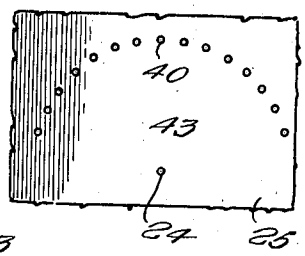


FIG. 10

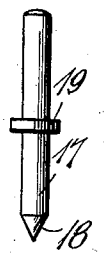


FIG. 5

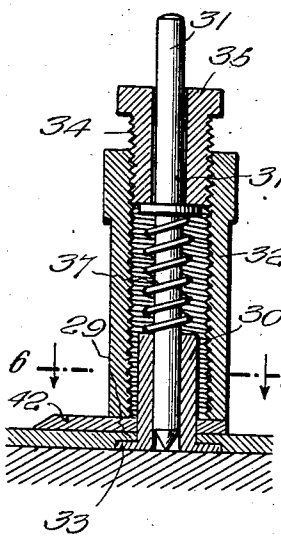


FIG. 7

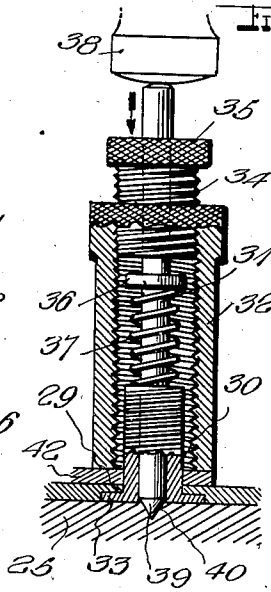


FIG. 8

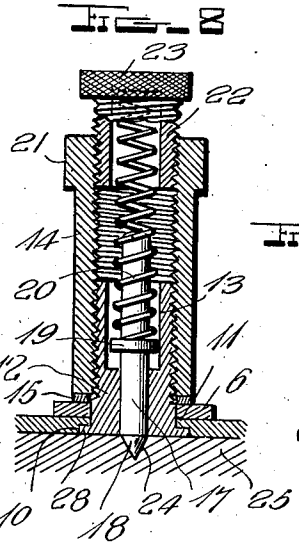


FIG. 9

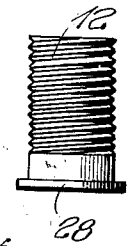
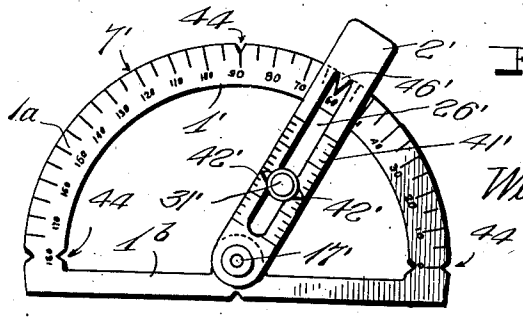


FIG. 13



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UNITED STATES PATENT OFFICE

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PROTRACTOR

William J. Adams, Washington, D. C.

Application March 30, 1938, Serial No. 199,006

8 Claims. (Cl. 33—75)

This invention relates to improvements in protractors or like scribing instruments.

One object of the invention is to provide a protractor which may be readily and conveniently used for scribing a circle or any part of a circle of a given diameter, marking off degree points, and inscribing straight lines at any degree angle radial to the center and circumference of the circle or any sector thereof.

Another object of the invention is to provide a protractor embodying relatively movable pivotally connected blade and frame members, one bearing an arcuate degree scale and one or the other carrying a radially adjustable indicating or marking pin whereby pattern drawings or layouts for boring, drilling or other work may be performed with ease and facility.

Still another object of the invention is to provide a protractor of a type suitable for the production of instruments for the use of draftsmen, model and pattern makers and machinists in more readily and proficiently carrying out certain kinds of their work.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Fig. 1 is a plan view, with parts in normal position, of a protractor of a type embodying my invention adapted for scribing and layout marking work.

Fig. 2 is a view in side elevation of the protractor.

Fig. 3 is a bottom plan view thereof.

Fig. 4 is a view similar to Fig. 1 showing adjusted positions of the blade and marking pin for a certain kind of work.

Fig. 5 is a section on the line 5—5 of Fig. 1.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a similar section through the blade and marking pin, taken at right angles to that shown in Fig. 5 and illustrating a marking action.

Fig. 8 is a section on line 8—8 of Fig. 1.

Fig. 9 is a view of the bearing bushing of the pivot pin removed.

Fig. 10 is a view of one of the pins, for example the pivot pin.

Fig. 11 is a view of a templet or work plate or panel showing one kind of layout work for which the protractor is adapted.

Fig. 12 is a view of the marking pin pointer.

Fig. 13 is a view of a form of the protractor embodying the invention.

Referring now more particularly to Figs. 1 to 10, inclusive, and 12 of the drawings, I provide a protractor comprising a frame member 1 and a blade member 2. The frame member 1 comprises an arcuately curved body portion 3 having at one end an inwardly extending arm 4 and at the opposite end an outwardly extending arm 5, the arm 4 being provided at its free end with an apertured portion or bearing eye 6 and the arm 5 being of some material width to serve as a steady rest on which a portion of a hand of the operator may bear to hold the tool in position for scribing or other operations.

The blade member 2 comprises a substantially semi-circular plate having a curved edge 7 extending substantially through an arc of 180° and having an opposite straight edge divided on the opposite side of its center into two portions 8 and 9 respectively. The curved edge of the blade at one side underlies an overhanging flange or part of the body portion 3 so as to be guided thereby in its movements, and the upper face of the blade or plate is provided with scale graduations extending along its curved edge at 10° intervals and divisions thereof as shown.

The straight edge portion 8 of the blade extends radially of the circle of which the edge 7 forms an arc in line with one of the terminal degree graduations of the scale. The edge 9 at the opposite side of the center of the blade is, however, offset rearwardly beyond, but lies substantially parallel with, the line 8.

At the point of intersection of the edges 8 and 9 the blade is formed with an opening 10 having an overhanging flange 11. This opening receives the lower end of a bushing 12 having a tubular or sleeve portion 13 projecting upwardly therefrom, the upper portion of which bushing and which sleeve portion are provided with external screw threads. Engaging the threaded portions of this bushing and sleeve is an externally threaded tubular casing 14 bearing at its lower end against a washer 15 disposed between the same and the eye 6 of the frame member 3, whereby the bushing 12 and casing 14 are secured in position and a pivotal connection between the eye 6 and bushing 12 afforded on which the plate 2 may have swinging motion relative to the frame member 1 so that the degree point thereof may aline with an indicating edge 16 of the frame member lying in diametric alinement with the pivot point of the blade. The bushing 12 is bored to receive a setting pin 17 having a lower conical or pointed end portion 18, and which extends upwardly through the sleeve 13 and is provided with an abutment flange or shoulder 19. Encircling the upper portion of

this pin is a coiled pressure or backing spring 20 bearing at its lower end on the flange or shoulder 19 which limits the extreme downward movement of the pin 17. The upper end of the casing 14 is provided with a milled enlargement 21 forming a finger grip portion by which said casing member may be rotated in applying and removing it, and fitted in the upper end of this casing member is an adjusting sleeve 22 which receives the upper end of the spring 20 and is provided with a milled head portion 23 which bears thereon and by means of which the upper portion of the casing is closed and the pressure of the spring on the pin 17 adjusted to regulate its resistance to recession when bearing on a piece of work. The pointed end of the pin is designed to be fitted or forced into a recess 24 formed in a piece of work 25 to set or center the device at the pivot point for use, such pin and bearing exerted on the arm 5 being employed to hold the protractor steadfast in working position. The offset edge portion 9 of the blade 2 advantageously increases the area of said blade in the region of its pivot point in an obvious manner and increases its area of engagement with the body portion 3 of the frame member 1 so as to be better guided thereby.

Formed in the blade or plate 2 is a guide slot 26, which opens through the top and bottom of the blade. This slot terminates at one end adjacent to and in alinement with the pivot point of the blade and extends therefrom radially toward the curved edge of the blade with its opposite end terminating adjacent to the 90° graduation. The base of this opening intersects a guide groove 27 having straight parallel walls and which is formed in the underside of the blade and extends the full distance between its edges 7 and 9. This groove also intersects the opening 10 and receives a retaining flange 28 on the bushing 12 which underlies the flange 11, whereby said bushing is held from upward displacement, and opposite edges of this flange 28 may be made straight and parallel with the straight walls of the groove 27 to hold the bushing 12 from axial rotation.

Fitted to slide in the slot 26, which is narrower than the groove 27, whereby a flange 29 overhanging said groove is provided, is a bushing 30 which is bored for the passage of a marking pin or punch 31. This bushing is externally of non-circular form, having two flattened sides and two curved sides, the curved sides thereof being provided with screw threads to engage internal screw threads on a tubular casing 32, which is thus connected with the bushing to slide therewith longitudinally of the slot 26. The bushing is provided at its base with a flange 33 underlying the flange 29, whereby the bushing is held from upward displacement, and two of the opposite sides of this flange are made straight-surfaced for sliding engagement with the walls of the groove 27 and to hold the bushing from axial rotation. The pin 31 extends upwardly within the casing 32 and outwardly through a threaded adjusting sleeve 34 fitted in the upper end of the casing, which sleeve is provided with a milled gripping flange or enlargement 35. At a point above the bushing the pin 31 is provided with an annular flange or shoulder 36 and between this flange or shoulder and the bushing is interposed a coiled spring 37 which encircles the sleeve and exerts its expansive force on the flange to hold the marking pin normally elevated to a non-working position. By the blow of a hammer 38 or other tool delivered upon the upper end of the pin 31, the lower pointed end 39 thereof may be forced downward to form a marking or indicating depression 40 in the surface of the work 25. Extending parallel with and at one side of the slot 26 on the upper face of the plate 2 is a scale 41 indicating degrees of adjustment of the marking pin radially of the blade between its pivot and curved edge, so that indicating marks or depressions 40 may be formed in a piece of work at any distance radially of the blade from the setting pin 17 and in a circle or arc of any radius concentric with said pin as a center. Carried by the setting pin for cooperation with the scale 41 is a pointer 42 which is held between the plate 2 and base of the casing 32, the body of said pin, as shown in Fig. 12, having an angular opening therein conforming to the shape of the bushing 30 whereby the pointer is mounted to slide with the bushing and pin, but is held from axial rotation.

The construction of the protractor above described adapts it for many and various uses in drafting work and in inscribing or marking off a surface for the production of templets or patterns or for marking and preparing points extending in a circle or on an arc of greater or less radius and number of degrees for boring or other operations. Obviously the blade 2 may be adjusted on its pivotal connection at different angles with relation to the edge 16, as shown in Figs. 1 and 4, for the use of its curved edge in inscribing a circle of a fixed diameter of arcs of any degree of that circle, while the edge 8 may be used in inscribing straight lines at any point about and radially to the setting pin 17 and at an angle to the line described along the edge 7. As stated, the marking pin 31 may be employed for marking off portions of a piece of work for boring or other operations.

Fig. 11 shows a use for which it is adapted, for example, for making marks or indentations 40 in a radio panel 43 at spaced points in an arc concentric with a depression or recess 24 receiving the setting pin, the marks 40 indicating points at which the panel is to be bored or drilled to receive switch contacts or the like. Similarly, the protractor may be used for various and sundry kinds of scribing or marking work in forming templets, patterns and indicating boring or drilling points in all kinds of material.

Fig. 13 shows a modified form of the device which may be used in a similar manner to the device shown in Figs. 1 to 10, inclusive, but which provides a suitable form of device adapted particularly for drafting work, in which 1' is a frame member embodying a 180° protractor scale 1a having a scribing edge 7' and the ends of which are connected by a base or cross piece 1b to which a swinging blade member 2' is connected by a pivot and setting pin 17'. The blade is formed with a guide slot 26' and with scale indications 41' and in said slot slides a marking pin or indicator 31' having pointers 42' for cooperation with said scale indications and which may be similar in construction and mounting to the marking pin 31. At its free end the blade 2' is provided with a pointer 16' for cooperation with the 180° scale and at certain points on the 180° scale the frame member is provided with notches 44 for convenience of the draftsman in marking off scale points on the work. The many uses for which this modified form of the device is adapted will be readily understood from the foregoing description and will be apparent to model, tool and pattern makers, draftsmen and other like artisans.

From the foregoing description, taken in con-

nection with the drawings, the construction, mode of use and advantages of my improved protractor will be readily understood and appreciated by those versed in the art without a further and extended description. While the structures disclosed are preferred, it will, of course, be understood that changes in the form, construction and arrangement of parts within the scope of the appended claims may be made, without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is:

1. A protractor comprising relatively movable pivotally connected frame and blade members, said blade member having a curved edge extending on the arc of a circle concentric with said pivotal connection and being provided with degree graduations extending along said edge, one of said members being provided with an elongated slot extending radially in any relative position of said frame and blade members between said pivot point and the curved edge of the blade member, and a marking device adjustable along said slot and comprising a casing, a marking pin vertically movable in said casing and having a lower marking end adapted to be projected downward through the slot and an upper end portion projecting above the casing and adapted to be engaged by suitable means to force the pin downward, a spring for normally holding the pin retracted, and means for regulating the tension of said spring.

2. A protractor comprising relatively movable frame and blade members, one of said members being substantially of semi-circular form and having an arcuate scribing edge and provided along said edge with scale graduations, said members being pivotally connected at a point equidistant from and concentric with said edge, one of said members being provided with an elongated slot extending radially in any relative position of said frame and blade members between said pivot point and the curved edge of the blade member, and a marking device adjustable along said slot and comprising a casing, a marking pin vertically movable in said casing, said pin having a lower marking end portion, an upper end portion projecting above the casing and adapted to be engaged by suitable means to force the pin downward, and a shoulder disposed at an intermediate point thereon within the casing, a spring acting on said shoulder to hold the pin normally retracted, and means engageable with the casing for engagement with said shoulder to limit the upward movement of the pin and to adjust the working position of the pin and regulate the tension of the spring.

3. A protractor comprising relatively movable frame and blade members, one of said members being substantially of semi-circular form and having an arcuate scribing edge and provided along said edge with scale graduations, said members being pivotally connected at a point equidistant from and concentric with said edge, one of said members being provided with an elongated slot extending radially in any relative position of said frame and blade members between said pivot point and the curved edge of the blade member, and a marking device adjustable along said slot and comprising a bushing in slidable engagement at its lower end with the slotted member, a casing into which said bushing extends, a marking pin projecting at its lower end downwardly through the bushing and at its upper end above the casing, said pin being provided within the casing with a shoulder, a spring disposed about the pin between the bushing and shoulder and serving to hold the pin normaliy retracted, and a threaded sleeve fitted in the upper end of the casing and engageable with said shoulder to limit the upward movement of the pin and to adjust the working position of the pin and regulate the tension of the spring.

4. A protractor comprising relatively movable frame and blade members, one of said members being substantially of semi-circular form and having an arcuate scribing edge and provided along said edge with scale graduations, said members being pivotally connected at a point equidistant from and concentric with said edge, a spring retracted marking pin and punch carried by and movable with one of said members and slidably adjustable radially in any relative angular position of said blade and frame members between said pivot point and the curved edge of the blade member, and means for adjusting said marking pin to regulate its extent of projection and simultaneously regulating the tension of the spring.

5. A protractor comprising a frame member, a blade member comprising a plate having an arcuate scribing edge bearing scale graduations and a straight edge, the latter having a portion at one side of its center extending radially with respect to one end of said arcuate scribing edge and a portion at the opposite side of its center offset rearwardly of the line of the first-named portion, a setting pin pivotally connecting the frame and blade members at the point of intersection of said portions of the straight edge and concentric with the curved edge of the blade, said blade being provided with a slot extending radially between its curved edge and said pivot point, and a marking plunger adjustable along said slot.

6. A protractor comprising a frame member, a blade member comprising a plate having a curved edge bearing scale graduations and a straight edge, the latter having a portion at one side of its center extending radially with respect to and intersecting one end of said curved edge and a portion at the opposite side of its center offset rearwardly of the line of the first-named portion, a setting pin pivotally connecting the frame and blade members at the point of intersection of said portions of the straight edge and concentric with the curved edge of the blade. said blade being provided with a slot extending radially between its curved edge and said pivot point, a spring retracted marking plunger adjustable along said slot, and means for regulating the action of the retracting spring.

7. A protractor comprising a blade member in the form of a plate having an arcuately curved edge at one side thereof and provided along said edge with scale graduations, and a frame member embodying a body portion curved to conform and movable along said curved edge of the plate and angularly arranged arms at opposite ends of said curved body portion of the frame member, one projecting outwardly beyond the curved body portion of the frame member and curved edge of the plate and having a scribing edge and the other projecting inwardly from said body portion and radially with respect to the curved edge of the plate and pivoted at its inner end to the edge of the plate opposite the curved edge at a point concentric with said curved edge.

8. A protractor comprising relatively movable pivotally connected frame and blade members,

said blade member having a curved edge extending on the arc of a circle concentric with said pivotal connection and being provided with degree graduations extending along said edge, one of said members being provided with an elongated slot extending radially in any relative position of said frame and blade members between said pivot point and the curved edge of the blade member, and a marking device embodying a casing slidably mounted at its lower end for travel along said slot, a sleeve adjustably mount at the upper end of the casing, a marking pin extending through the casing and sleeve and having an upper striker end projecting above the sleeve and a lower pointed marking end disposed for downward movement through said slot, and a spring disposed between the pin and sleeve for normally holding the pin retracted.

WILLIAM J. ADAMS.