G. H. CRESSE.

GLOBE RULER AND PROTRACTOR.

APPLICATION FILED JAN. 13, 1915.

1,175,612.

Patented Mar. 14, 1916.

2 SHEETS—SHEET 1.

Fig. 3.

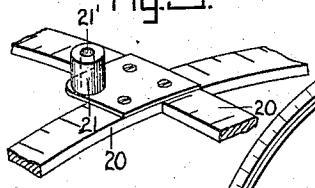


Fig. 1.

Fig. 6.

Fig. 4.

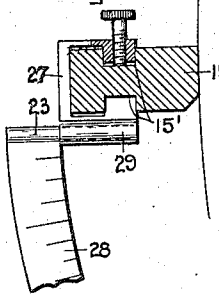


Fig. 5.

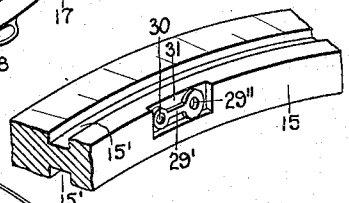
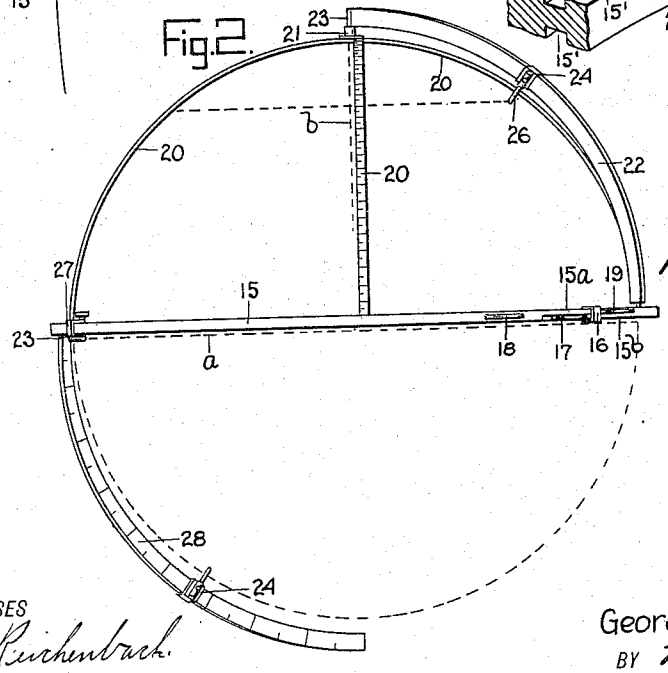


Fig. 2.



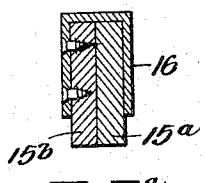


Fig. 6a.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 7.

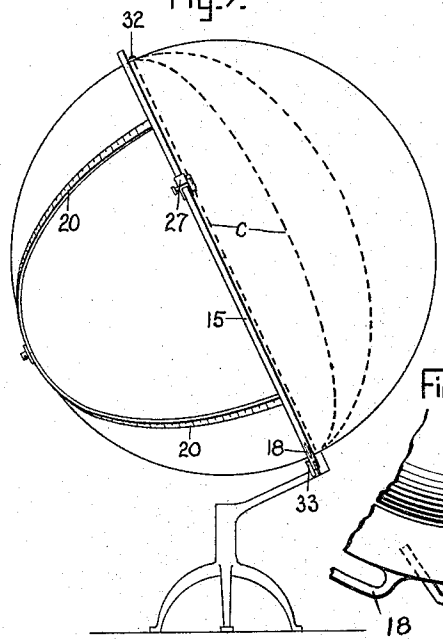


Fig. 8.

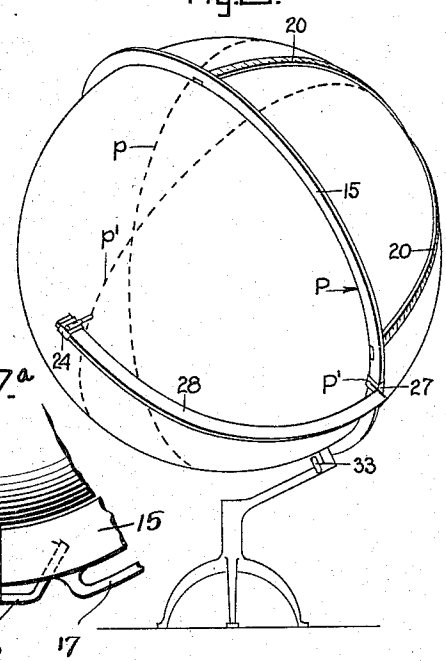


Fig. 7a

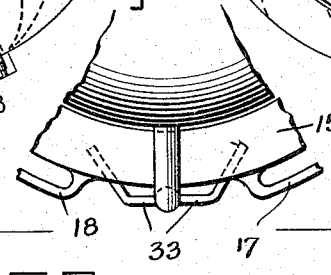


Fig. 9.

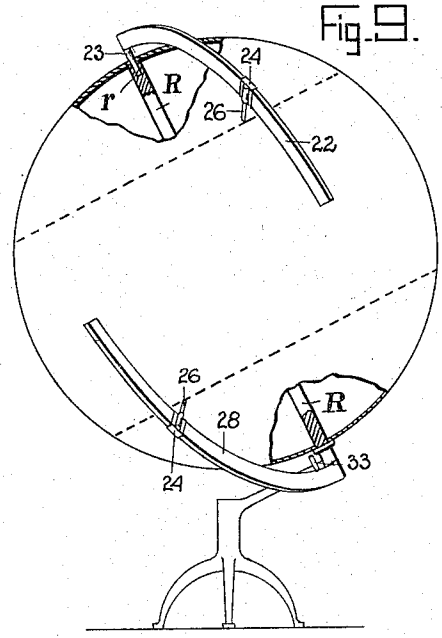
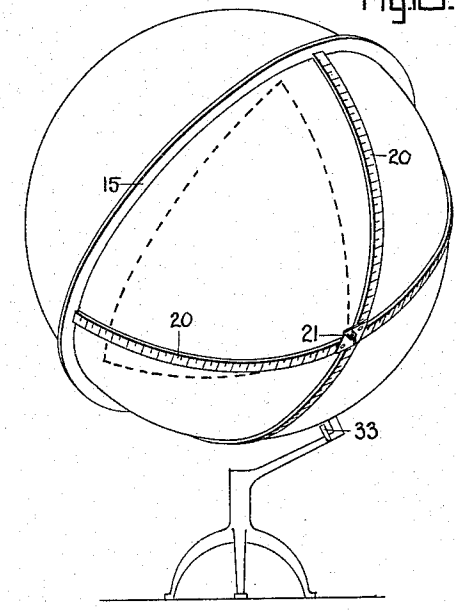


Fig. 10.



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GLOBE RULER AND PROTRACTOR.

1,175,612. Specification of Letters Patent. Patented Mar. 14, 1916.

Application filed January 13, 1915. Serial No. 1,950.

To all whom it may concern:

Be it known that I, GEORGE H. CRESSE, a citizen of the United States, and a resident of Middlebury, in the county of Addison and State of Vermont, have invented a new and Improved Globe Ruler and Protractor, of which the following is a full, clear, and exact description.

This invention relates to instruments of precision and has particular reference to drawing and measuring devices for globes or spherical objects.

Among the objects of the invention is to provide an apparatus adapted especially for use upon globes for experimental or demonstrating purposes in classrooms, lecture halls, laboratories or the like, for instruction along the lines of geography of the globe, spherical geometry and trigonometry, astronomy and the like.

More definitely stated, among the principal objects of the invention is to provide an apparatus of simple construction, easy of application and manipulation, and of the most reliable nature with respect to minor demonstrations along the lines above intimated.

A further object is to provide what I term a great circle band in the form of a split resilient ring adapted to be placed upon a globe of standard size, the structure of the ring being such that it will automatically grip upon the globe and be self-retained in the position in which it is placed.

Another object of the invention is to provide in connection with the great circle band a plurality of intersecting semi-circular straps which I term meridian quadrants, such straps being connected at their ends to the inner edge of the great circle band at substantially right angles, the inner edge of said band being the edge that lies adjacent the surface of the globe and toward the center thereof, as distinguished from the outer edge or periphery of the band.

A still further object of the invention is to utilize one or more circling devices to be used either in connection with the great circle band directly or with a polar knob carried by the meridian quadrants or elsewhere as may be desired and more fully explained below, each of the circling devices being provided with a pencil or marker movable therealong according to the size of circle desired.

The foregoing and many other objects of the invention will hereinafter be more fully described and claimed and illustrated in the drawings forming a part of this specification in which like characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a plan view of the entire apparatus with the globe omitted; Fig. 2 is a side elevation of the same; Fig. 3 is a detail perspective view of the relation of the polar knob to the intersecting meridian quadrants; Fig. 4 is a sectional detail on the line 4—4 of Fig. 1; Fig. 5 is a perspective detail view of the great circle band opposite the split portion; Fig. 6 is a sectional detail of the marker slide; Fig. 6^a is a detail view of the keeper coöperating with the overlapping free ends of the open portion of the great circle band; Figs. 7 to 10 are diagrams illustrating different uses of the apparatus. Fig. 7^a is a detail view indicating the means for steadying the great circle band.

The several parts of this device may be made of any suitable materials, and the relative sizes and proportions, as well as the general design of the mechanism, may be varied to a considerable extent without departing from the spirit of the invention hereinafter more fully described and claimed.

Referring more particularly to the drawings, I show at 15 a great circle band approximating in size the great circle of a standard globe with which the device is adapted to be used. This band is shown as having its ends 15^a and 15^b overlapping each other and retained close together by means of a keeper 16. The keeper may be of any suitable nature but shown herein as comprising a member secured to the band end and extending thence over the other overlapping end as shown in Fig. 6^a. As before intimated, the band 15 is made preferably of resilient material and having a tendency to automatically grip the globe in the place it is set. By application of the operator's fingers, however, to the finger pieces 17 and 18 connected to the adjacent ends of the band, the grip may be increased for certain purposes such as in the use of the band as a base for drawing upon the surface of the globe a great circle, or for steadying the band and globe at any time. Another finger piece 19 is connected to the

end 15ª on the opposite side of the finger piece 17 from the one numbered 18, and the application of the fingers to the members 17 and 19 will serve to distend and release the grip of the band for manipulating the device independently of the globe as for removing and replacing it.

At 20 I show a plurality of straps or bands termed herein meridian quadrants having their ends connected to the inner edge or surface of the great circle band. The meridian quadrants are mortised into the band so that their inner surfaces will conform to the surface of the globe the same as does the inner edge or surface of the band. I show two of these meridian quadrants crossing each other at right angles and mortised to each other so as to conform snugly to the surface of the globe as suggested in Fig. 3. These members are slightly shorter, say one-quarter of an inch shorter on a twelve inch globe, than the length of a semicircle, whereby the great circle band is held with its lower surface or surface opposite the meridian quadrants just above the true great circle to be drawn thereby, as shown by the dotted line *a*, Fig. 2.

Connected to the meridian quadrants closely adjacent their point of intersection is a pivot member 21 termed herein a polar knob. This knob has a pivot hole 21′, the axis of which is radial with respect to the globe and offset slightly from the edges of the meridian quadrants on the sides or edges of the quadrants or remote from overlapping portions of the great circle band as shown best in Fig. 1. By this means the meridian quadrants are adapted for drawing true arcs of great circles from a point which is the pole of the great circle band in the position in which it is located at such time, as shown by the dotted lines *b*, Figs. 1 and 2. These meridian quadrants, as well as the great circle band, are graduated preferably in degrees, the zero of the quadrant members being arranged on each of them directly opposite the axis 21′ of the polar knob. The graduations may be formed on any edge or surface of the great circle band, but preferably continuous from 0 to 360 degrees. Obviously, in order to draw a great circle having any known point as its pole, the great circle band by manipulation through the finger pieces 17 and 19 could be placed directly upon the globe with the hole 21′ of the polar knob registering with said point. The band 15 will then be gripped to the globe in position for the circle to be drawn below it, and the circle may be drawn complete, since there is no obstruction or projection extending from the active face of the band. In globes having a solid axis rod I prefer to drill holes in the poles of the axis rod, as will be understood from Fig. 9, and hence to draw an equatorial circle on a terrestrial globe it is a simple manner to aline the hole 21′ with the hole at the North Pole of the axis rod.

At 22 I show one of the attachments which I term the small circler. This member is preferably slightly shorter than a quarter of the great circle and has at one end a pivot pin 23 having its axis radial of the globe so that the main portion of the member 22 will be held parallel to but slightly spaced outwardly from the spherical surface. Any edge surface of the small circler may be graduated in degrees beginning at the axis of the pivot pin 23, and movable along the arc-shaped member 22 is a slide 24 adapted to be set by a set screw 25 or the equivalent at any desired angular distance from the pivot 23. The slide is adapted to carry a crayon or other marker 26 which is arranged radially with respect to the globe. It will be understood, from what has been stated, that by adjustment of the slide along the small circler and with the parts arranged as shown in Fig. 2, a movement of the small circler around the pin 23, any circle smaller than the great circle may be drawn from the pole determined by the position of the polar knob 21 at such time. The movement of the member 22 is practically unobstructed at such time, the marker passing readily over the pin and comparatively narrow meridian quadrants 20. This operation obviously may be performed when the combined great circle band and meridian quadrants are located on any part of the globe. Fig. 9, however, shows the use of the small circler applied directly to the particular point, namely, the North Pole of the globe.

At 27 is shown a runner mounted upon the great circle band and slidable along any suitable number or form of grooves 15′ formed in the opposite faces thereof.

Among the many uses which may readily suggest themselves to an operator skilled in the use of such apparatus may be noted that of a protractor quadrant 28 of a nature somewhat similar to the small circler 22, but preferably slightly longer than 90 degrees, the same being provided with a pivot pin 23 coöperating with a socket 29 carried by the runner 27, the axis of the socket being radial with respect to the globe. In this use of the device and with a marker slide 24 applied to the quadrant 28 and 90 degrees from the pin 23, spherical angles may be readily and accurately drawn as indicated in Fig. 8 with the points P and P′ as poles and with the great circle band connecting said points. In other words, the runner 27 being adjusted along the band 15 with the pin 23 indicating the point P, a rotation of the quadrant 28 around such point as the center will describe one arc *p*, and then by sliding the runner 27 to bring the pivot pin over the point P′, a rotation of the quadrant will describe the

arc p' forming with the first arc a spherical angle equal to the angular distance between the two points along the great circle band. Obviously either of the circling members 22 or 28 may be used in connection with the runner 27. If a small circle having a spherical radius of over 90 degrees from a certain point or a pole is required, a point of the great circle band will be applied to said certain point, and by observing the scale on the band the diametrically opposite point of the globe may easily be located by noting the point on the scale 180 degrees from the point in question. The runner 27 may then be moved to the new point which is the second pole of the circle required and the polar distance of such circle will be 180 degrees minus the arc first mentioned. With the polar distance treated as the spherical radius and with the second pole for the pivot point, the required circle is drawn with the member 22.

For the drawing of meridian circles of a terrestrial globe, as indicated in Fig. 7, such globe having a polar axis rod R with a North Polar cavity r, I provide what I term a North Pole fixture 29′ such as shown in Fig. 5, the same being pivoted at 30 in a recess 31 formed in the inner surface or edge of the great circle band and having a hole 29″ in the free end thereof which, when the fixture 29′ is turned out at right angles to the band, the center of the hole registering with the North Polar cavity will be far enough at one side of the band to permit true meridian circles being drawn as indicated at c. Any suitable pin 32 may be passed through the hole 29″ and polar cavity to hold this portion of the device in place, and at this time the overlapping end portions of the band will rest against or upon what I term stabilizing bars 33 adjacent the South Pole of the globe. The globe may, therefore, be rotated with practical freedom while the band 15 is held stationary for the purpose just described.

By noting the illustration in Fig. 10 it will be appreciated how the device may be used in a reliable manner in the drawing of a triangle polar to any given triangle such as the one indicated in dotted lines. By distending the great circle band 15 and applying it to the globe with the axis of the polar knob 21 opposite any angle of the given triangle, that portion of the band opposite the split portion may then be used directly as a ruler to mark off one side of the desired triangle, and then by subsequently adjusting the axis of the polar knob to each of the other angles of the given triangle in turn, the other two sides of the polar triangle may be formed.

It will be observed that the members 20 termed the meridian quadrants, being of flexible material, may have a certain inherent tendency to grip the hemisphere embraced thereby and hence coöperate with the great circle band to hold the same in position.

I claim:—

1. In a device of the class set forth, the combination of a great circle band having overlapping ends and adapted to grip snugly upon globes of varying diameters, means connected to the band to limit its lateral movement into position so as to make the band conform to a great circle to be drawn upon the globe, and finger pieces secured to the overlapping ends of the band whereby the grip thereof upon the globe may be either increased or diminished.

2. In a device of the class set forth, a great circle band having free overlapping end portions, means adjacent thereto for manipulating the band to distend the same or for increasing its grip upon a globe, a runner slidable around the band from one of the overlapping ends to the other, and a small circle pivoted to said runner.

3. In a device of the class set forth, a great circle band having free overlapping ends, means connected to said ends to prevent accidental relative lateral displacement thereof, means connected to the ends for manipulating them to cause them to slide longitudinally of each other for distending and also contracting the band, and means carried by the band and extending laterally from one side of the plane thereof to hold it in position upon a globe for drawing a great circle along the other side of the band.

4. In a globe ruler and protractor, the combination of a great circle band having inner and outer edges and two sides, meridian quadrants connected to the band and extending thence at right angles from one side thereof, said quadrants having their inner surfaces lying flush with the inner edge of the band, and means carried by the band to cause it and the meridian quadrants to grip snugly in holding position in contact with the globe when applied thereto from any direction.

5. In a device of the class set forth, the combination of a great circle band having inner and outer edges and two sides and a pair of meridian quadrants having their ends connected to the inner edge of the band and having their inner surfaces flush with the inner edge of the band, said quadrants extending substantially at right angles from one side of the band and intersecting each other substantially at right angles at a point slightly spaced from the polar axis of the band.

6. In a device of the class set forth, the combination of a great circle band having an opening at one polar portion thereof and a North Pole fixture connected thereto at the opposite polar portion, and a plurality

of meridian quadrants having their ends connected to the band, said quadrants extending thence laterally from the plane of the band and intersecting each other substantially at right angles just beyond the polar axis of the band on the side of the polar axis opposite from the North Pole fixture.

7. The combination with a globe, of a resilient great circle band having free overlapping ends and adapted to surround the globe adjacent the great circle thereof and adapted to automatically grip itself upon the globe, finger pieces connected to the overlapping end portions of the band for increasing or decreasing the gripping effect thereof upon the globe, a polar knob, means connected to the band for supporting the polar knob with its center at the precise polar axis of the band, and a small circler pivoted to said knob, substantially as set forth.

8. In a device of the class set forth, the combination with a globe having a fixed polar axis rod and stabilizing means secured adjacent one of the poles of said axis rod, of a great circle band and means connected to one polar portion of the band for coöperation with the other pole of said axis rod while the opposite polar portion of the band coöperates with said stabilizing means, substantially as set forth.

9. The combination with a globe having a polar axis rod extending therethrough and stabilizing means adjacent the South Pole of said axis, of a great circle band adapted to fit around the globe closely adjacent a true meridian circle thereon, a North Pole fixture connected to one polar portion of the band for coöperation with the North Pole of the axis rod, while the opposite polar portion of the band is held against said stabilizing means, and a runner slidable around said band from one side of the stabilizing means to the other.

10. In a device of the class set forth, the combination of a great circle band adapted to automatically grip around a globe adjacent a great circle thereof and thereby hold itself upon the globe, a plurality of meridian quadrants having their ends connected to the band and having their inner surfaces together with the inner edge of the band conform snugly to the spherical surface of the globe, said quadrants intersecting each other substantially at right angles adjacent the true polar axis of the band, and a polar knob secured to the quadrants at their point of intersection but having the radial axis of the knob spaced outwardly from said point of intersection, the quadrants being graduated in degrees starting at zero at points opposite said knob axis.

11. The combination of a great circle band, a bearing member secured to the band and having a bearing coinciding with the polar axis of the band, an arc-shaped member having one end pivoted in said bearing, the arc-shaped member being movable over a segment of the globe, around said polar axis, and a marker slidably adjustable upon said arc-shaped member for describing arcs of circles of any desired radius around said polar axis.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE HOFFMAN CRESSE.

Witnesses:

F. M. Foote,

Charles I. Button.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."