(No Model.)

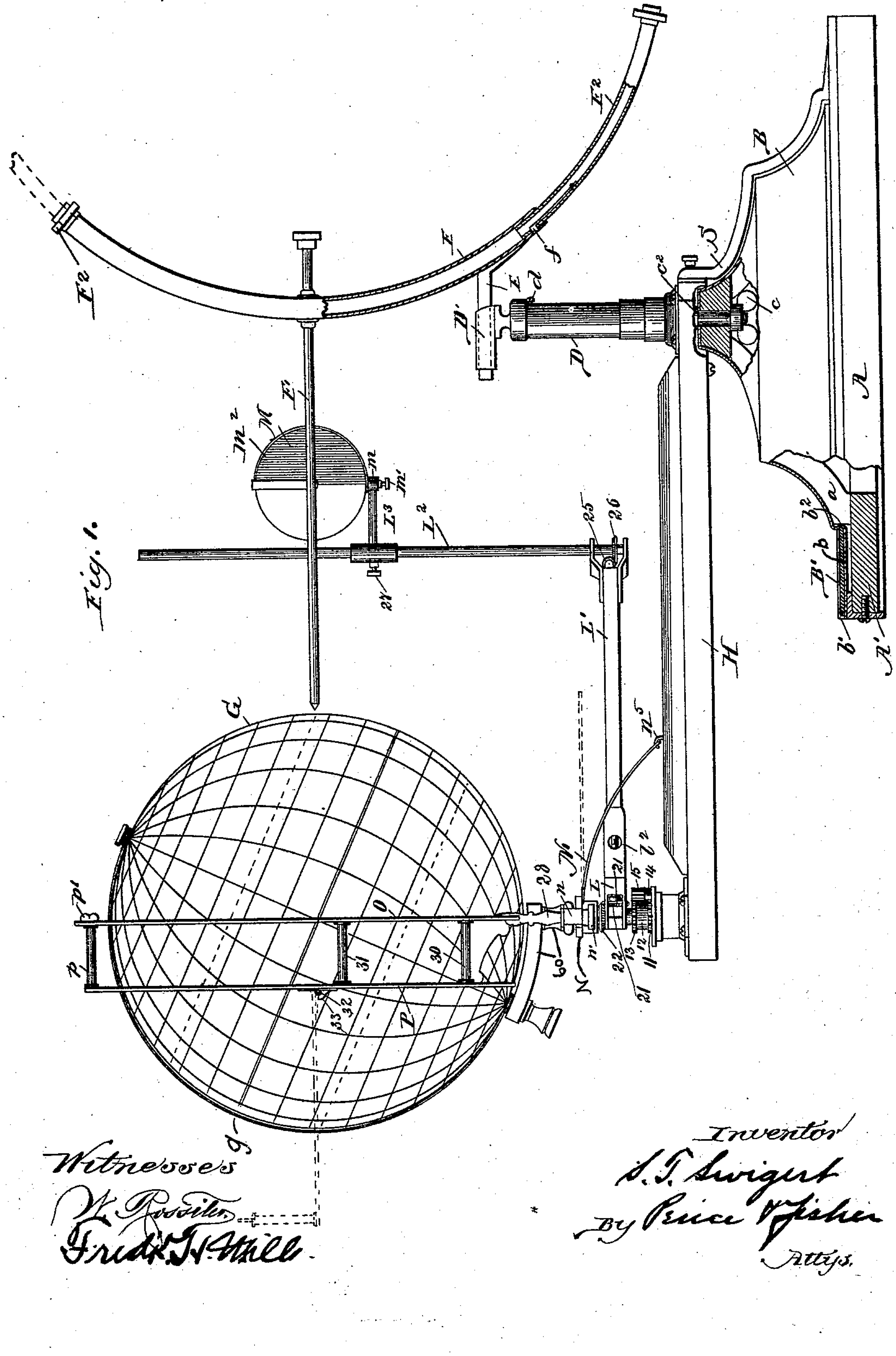
3 Sheets—Sheet 1.

S. T. SWIGERT.

TELLURIAN.

No. 455,419.

Patented July 7, 1891.



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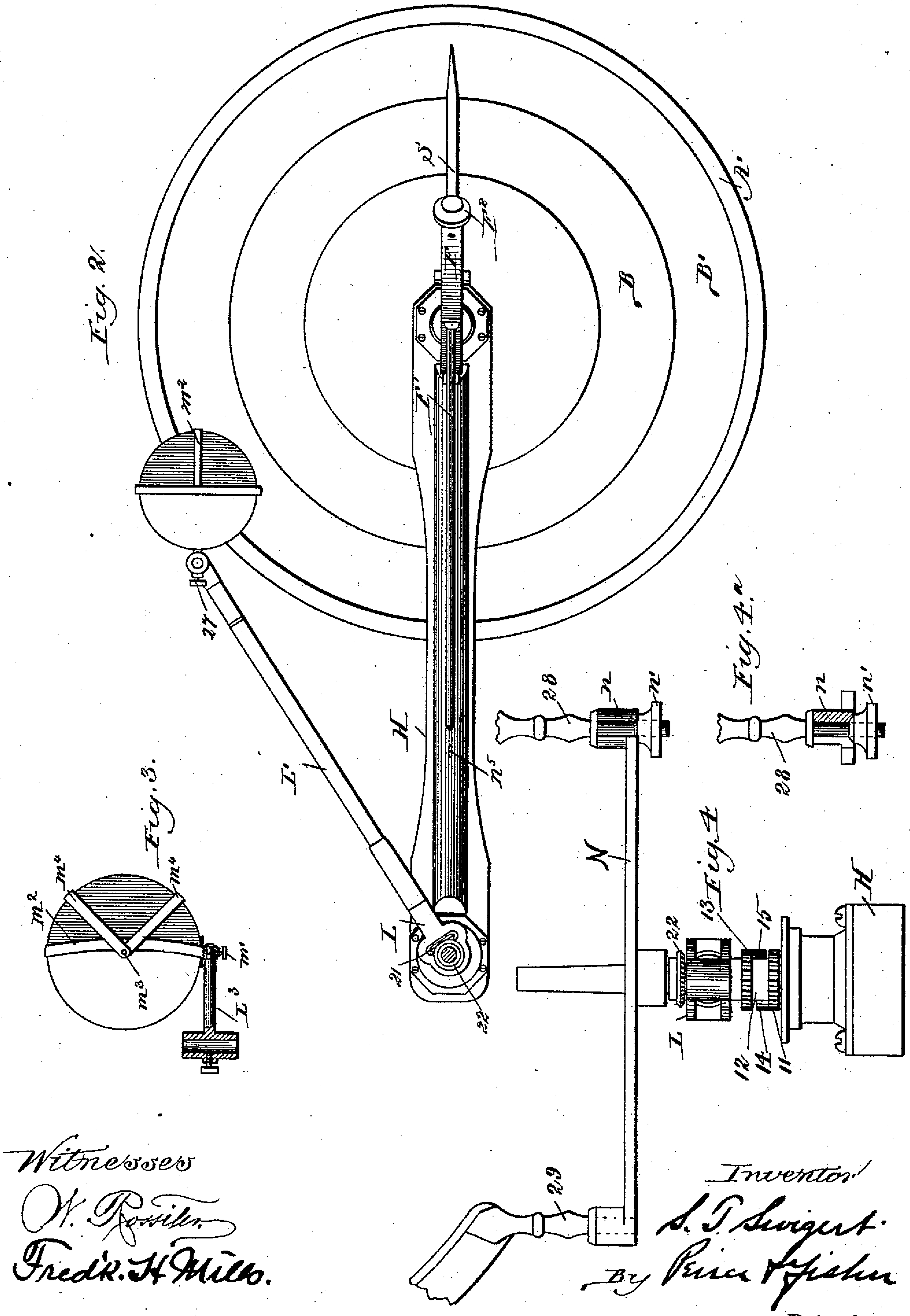

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(No Model.) 3 Sheets—Sheet 3.

S. T. SWIGERT.

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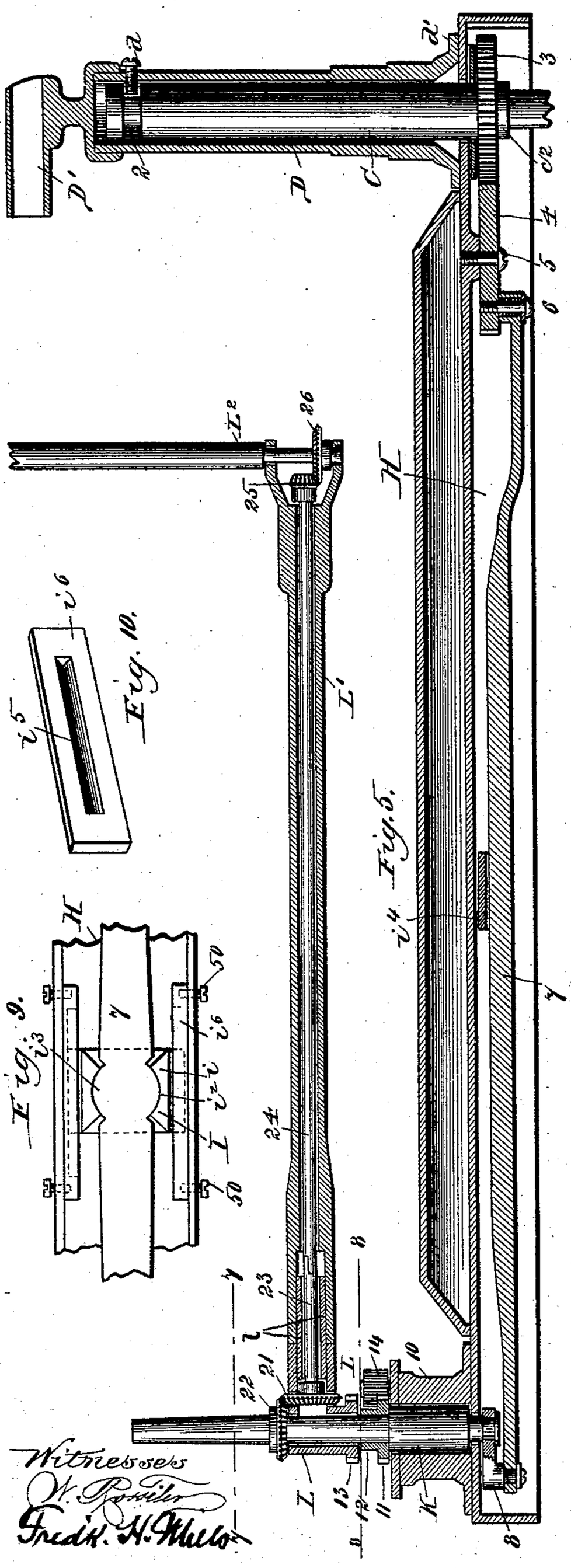

Fig. 10.

Fig. 9.

Fig. 5.

Fig. 6.

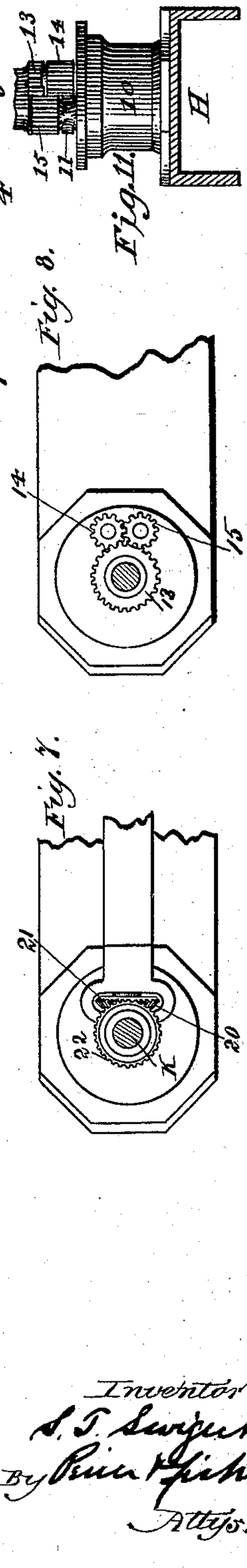

Fig. 11.

Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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TELLURIAN.

SPECIFICATION forming part of Letters Patent No. 455,419, dated July 7, 1891.

Application filed May 7, 1890. Serial No. 350,871. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. SWIGERT, a citizen of the United States, residing in Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Tellurians, of which I declare the following to be a full, clear, and exact description, reference being had to accompanying drawings, forming part of this specification.

My invention consists of various novel features of construction to be hereinafter described, and particularly pointed out in the claims at the end of the specification.

Figure 1 is a view in side elevation, parts being broken away. Fig. 2 is a plan view of the tellurián, the earth-globe being removed. Fig. 3 is a detailed view in side elevation of the moon-ball and the bracket for sustaining the same, the socket of the bracket being shown in section. Fig. 4 is an enlarged view in end elevation of the outer part of the orbit-bar and the parts sustained thereby. Fig. 4ª is a detailed fractional view, partly in section and partly in elevation, of one end of the bar that sustains the circles of illumination and twilight. Fig. 5 is a view in vertical longitudinal section through the orbit-bar, the moon-bar, and adjacent parts, certain parts being shown in elevation. Fig. 6 is an inverted plan view of the orbit-bar and mechanism beneath the same. Fig. 7 is a view in section on line 7 7 of Fig. 5. Fig. 8 is a view in section on line 8 8 of Fig. 5. Fig. 9 is an inverted plan view of the central portion of the orbit-bar, showing the slide-block for sustaining the pitman beneath this bar. Fig. 10 is a detailed perspective view of one of the side plates for the bearing or box of the pitman. Fig. 11 is a detail view showing the arrangement of the gear mechanism at the base of the earth-shaft.

A designates the rim of the base A′ of the apparatus, this base being preferably formed as a casting having upwardly-extending ribs *a* of usual or suitable construction, that converge at their top and are covered by a cap-plate B. This cap-plate B is preferably of brass made of some ornamental contour, and the bottom of the cap B is by preference formed by a horizontal ledge *b*, whereon will be placed the zodiacal strip B′. By preference, also, the cap B will have at its outer edge an upturned flange *b*′, and will be provided with a groove b^2 to better retain the zodiacal strip B′ in place. Through the apex of the base A′ passes a post C, that is held in place by means of a jam-nut *c*, that binds the shoulder c^2 against the apex of the base and holds this post C against rotation. Over the post C is set the sun standard or support D, through the upper portion of which passes a set-screw *d*, that enters a groove 2, formed in the top of the post C.

Upon the top of the standard D is sustained a bracket D′, preferably having the hollow upper portion, in which slides the arm E, that projects from and serves to sustain the sun-bar F. This sun-bar F is provided at its center with a perforation, through which will pass the needle F′, that serves to indicate the direct central ray of the sun. The sun-bar F is made extensible, preferably by providing this bar with the extensions F^2, corresponding in curvature with the bar and adapted to slide therein. The inner end of each of the extensions F^2, as shown, is provided with a spring-catch *f*, adapted to enter a notch adjacent the end of sun-bar F, so as to prevent the entire withdrawal of the extensions F^2 from the sun-bar. From this construction it will be seen that by mounting the sun-bar F, so that the arm E can be moved back and forth within the bracket D′, the teacher will be more readily able to indicate to the pupil the varying distance between the sun and the earth incident to the earth's elliptical orbit. So, also, by making the sun-bar F extensible, the fact that the sun is much larger than the earth can be more readily demonstrated.

The earth-globe G is sustained upon the outer end of the orbit-bar H, the inner end of this bar being mounted upon the post C and being sustained by the base of the apparatus. Upon the post C is fixed a gear-wheel 3, with which engages a gear-wheel 4, that is journaled upon a pin or stud 5, depending from the orbit-bar H, and from this gear-wheel 4 projects a pin 6, to which is fastened the inner end of a pitman 7, that lies beneath the orbit-bar and is adapted to receive both a reciprocating and rocking motion. The outer end of the pitman 7 is connected to an arm 8, that is keyed to the earth-

shaft K, this shaft being journaled in a bearing block or pillar 10, that is fastened to the outer end of the orbit-bar H. To the shaft K is keyed the gear-wheel 11, from which rises a sleeve 12, whereon rests a gear-wheel 13, that is attached to the inner end or socket L of the moon-bar. Upon the top of the post 10 is journaled a pinion 14, that engages with the gear-wheel 11, and engages also with the pinion 15. The lower portion of the pinion 15 is cut away, so that it will not mesh with the gear-wheel 11; but the upper portion of this pinion 15 engages with the gear-wheel 13 upon the inner end or socket L of the moon-bar. Within the inner end or socket L of the moon-bar is sustained the section 23 of the moon-shaft, this section having at its end a beveled pinion 21, that engages with a correspondingly-beveled pinion 22, that is keyed to the shaft K. The section L′ of the moon-bar is provided with a reduced portion or sleeve l, over which the section L′ of the moon-bar will fit, and through this section L′ extends the section 24 of the moon-shaft. The outer end of the section 24 of the moon-shaft is provided with a beveled pinion 25, adapted to engage with a correspondingly-beveled pinion 26 upon the end of the moon-post L^2, this post being stepped in the outer yoke-shaped end of the moon-bar, as seen in Fig. 5. The sections 23 and 24 of the moon-shaft will be, respectively, provided with a tongue and groove, as seen in Fig. 5 of the drawings, so as to permit these sections to be engaged and form a continuous shaft when the sections of the bar have been placed together for use. By preference, also, the section L′ of the moon-bar will be provided with a sight-opening l^2, which will permit the engagement of the sections of the moon-shaft to be readily observed. Upon the moon-post L^2 is mounted, in manner permitting it to be vertically adjusted, a bracket L^3 that serves to sustain the moon-ball M, the position of this bracket upon the moon-post being determined by a set-screw 27. The moon-ball M is connected to the outer end of the bracket L^3 by means of a swivel-socket m, through which the outer end of the bracket L^3 projects, and the position of the moon-ball upon the bracket L^3 is determined by means of a set-screw m'. Across the face of the moon-ball M and suitably connected to its axis extends a semicircular band m^2, which can be shifted to any position around the face of the moon in order to enable the teacher to more readily demonstrate to the pupil the various phases of the moon. So also the moon-ball M is provided with a transverse axis m^3, to the ends of which are connected the semicircular bands m^4, the positions of which can be shifted freely around the face of the moon. My purpose more particularly in employing the band m^4 is to more readily indicate to the pupil the different positions of the horns of the moon, as, for example, in what are commonly known as "wet" and "dry" moons. By the use of these bands m^4 the teacher will be enabled to more readily show, by making a complete circle of these bands, how it happens that at certain times during the first quarter of the moon the entire outline of the moon is faintly observable.

My object in mounting the moon so that it can be adjusted vertically upon the moon-post L^2 is to permit the teacher to more readily demonstrate the different positions in which the moon is seen.

The pitman 7 is mounted in a manner free to rock within a sliding box or bearing I. This box or bearing is shown in the drawings as having sides i, provided with curved seats i^2 to receive correspondingly-curved projections i^3, formed upon the pitman; but it is obvious, if desired, the projections might be formed upon the box or bearing and the seats be formed in the pitman, as this would be but a reversal of the construction shown. The sides of the box or bearing I are also shown as connected together by means of a top plate i^4, although I do not regard this as essential, as the sides of the box or bearing may be held in position in any other convenient manner. Thus, for example, in the preferred form of sliding box or bearing illustrated in Fig. 9 the side plates i of the box are shown as provided with curved seats i^2, adapted to receive correspondingly-curved projections i^3, extending from the pitman 7; but in this construction the side plates i of the box or bearing I are provided each with a rib (shown by dotted lines in Fig. 9) that extend into a long seat i^5, formed in an adjusting-plate i^6. One of these adjusting-plates i^6 is placed at each side of the box or bearing I, and these plates are held in position by means of set-screws 50, so that they may be moved up from time to time to compensate for wear. A further advantage in the employment of these plates i^6 is that a smooth bearing-surface can be afforded for the box or bearing I, although the inner face of the orbit-bar H may be very rough on account of its being of cast metal.

Upon the upper end of the earth-shaft K is keyed the earth-carrying arm 60, through the outer end of which passes the shaft or axis whereon the earth-globe G is mounted in a manner free to revolve.

Upon the shaft K beneath the socket of the arm 60 is set the centrally-perforated bar N, that serves to sustain the circles of illumination and twilight O and P.

As it is sometimes desirable to remove the circles O and P from the globe, I detachably connect these circles to the bar N by means of the posts 28 and 29, that enter corresponding seats or sockets in the ends of the bar N. By preference, also, the socket n at one end of the bar N is formed as an open socket, and the corresponding post 28 is screw-threaded to receive a jam-nut n', which serves to tightly bind the posts in position. Hence it will be seen that if it is desirable to remove the circles O and P it is only necessary to loosen the

jam-nut n', (see Figs. 4 and 4^a,) then turn the post 28 from out the socket n, and then lift the post 29 from out its socket.

As it is sometimes desirable to remove the moon-ball M and the moon shaft and arm, and at such time to hold the circles O and P so that they shall maintain a fixed position with respect to the central sun's ray F', I prefer to provide the bar N with a spring-arm N', adapted to connect said bar to the orbit-bar H, and for this purpose the spring-arm N' is provided at its outer end with a hole into which enters a hook or pin n^5, that projects from the top of the orbit-bar. The circles O and P are connected together by suitable rods 30 and 31, about their lower portion, and the upper half of the circle P is united by a hinge 32 to the lower part of this circle, so that the upper portion of circle P can be turned to a horizontal position, as seen in dotted lines in Fig. 1, and can be retained in this position by reason of the lugs 33, that project from the lower portion of the circle P.

In order to firmly unite the circles O and P together, so that they will form an accurately-defined plate around the globe G, I provide a catch-rod p, that is preferably permanently attached to the circle P, and has a swivel-button p', adapted to enter an oblong slot at the top of the circle O, so that when this button p' is turned to the position seen in Fig. 1 it will hold the circles O and P in exact position in respect to each other, and thus accurately define the twilight-belt around the globe G. The orbit-bar H will have fixed to its inner end a pointer S, that will extend to a point above the zodiacal circle B' in well-known manner.

From the construction of parts as thus far defined it will be seen that if rotation be imparted to the orbit-bar H, the movement of this bar about the stationary post C will cause the gear-wheel 4 to revolve by reason of its engagement with the gear-wheel 3, that is fixed to the post, and this revolution of the gear-wheel 4 will cause a back-and-forth movement of the pitman 7, and also a rocking movement of this pitman in the box or bearing I, that is caused to slide back and forth with the pitman. The movement thus given to the pitman will, through the medium of the crank 8, impart rotation to the shaft K. As the shaft K is thus rotated, the gear-wheel 11 upon this shaft will engage with the pinion 14, causing this pinion 14 to rotate and impart rotation to the pinion 15 that meshes therewith, and the rotation of the pinion 15 will, by reason of its engagement with the gear-wheel 13 of the section L of the moon-bar, cause a rotation of the moon-bar about the shaft K. As the moon-bar is thus rotated about the shaft K, the engagement of the beveled pinion 21 of the moon-shaft with the beveled pinion 22, that is keyed to the shaft K, will cause a rotation of the moon-shaft, which, through the medium of the beveled pinions 25 and 26, will be imparted to the moon-post L^2, thereby causing the rotation of the moon-globe M about such post. At the same time the rotation of the shaft K will cause, through the medium of the earth-carrying arm 60, the earth-globe G to rotate in the usual manner.

From end to end of the earth's axis extends the semicircular strip g, by which the latitude and time of sunrise for any desired point upon the earth's surface can be readily obtained, and my object in thus using a semicircular strip is to enable the latitude and time of sunrise for places in the southern hemisphere to be more readily and accurately determined than where a simple segment-shaped pointer extending over the northern hemisphere only, is employed for this purpose.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the class described, the combination, with the earth-globe and a bar extending in a vertical plane opposite said earth-globe to indicate the sun's area, of a support for said vertically-extending bar and whereon said bar is horizontally adjustable to permit it to be adjusted toward and from the earth-globe, substantially as described.

2. In apparatus of the class described, the combination, with an upwardly-extended bar representing the sun, of a support for said bar provided at its top with a sleeve, and an arm projecting from said bar into said sleeve, whereby said bar may be adjusted toward and from the earth-globe, substantially as described.

3. In apparatus of the class described, the combination, with a bar representing the sun, of one or more movable end extensions for said bar, whereby the extent of said bar may be increased to better indicate the size of the sun, substantially as described.

4. In apparatus of the class described, the combination, with a hollow curve-bar representing the sun, of one or more end extensions adapted to slide into and be withdrawn from said curve-bar, substantially as described.

5. In apparatus of the class described, the combination, with the post C, provided with a gear-wheel, of an orbit-bar H, provided with depending sides and provided at its inner end with a gear-wheel engaging with the gear-wheel of the post, a pitman connected to said gear-wheel of the orbit-bar at one end and at its opposite end provided with a crank, an earth-shaft to which said crank is directly attached, and a sliding box or bearing within the orbit-bar in which the pitman is mounted, said sliding box or bearing being held between the depending sides of said orbit-bar, substantially as described.

6. In apparatus of the class described, the combination, with the orbit-bar H, provided with depending sides, the pitman 7, and a suitable connecting mechanism, of a sliding box or

bearing between the depending sides of and beneath said orbit-bar, whereon said pitman is mounted in a manner permitting it to rock, and adjustable side plates for said box or bearing, substantially as described.

7. In apparatus of the class described, the combination, with the orbit-bar and an earth-shaft and suitable means for rotating said shaft, of a moon-bar carried by said shaft, and a moon-shaft within said moon-bar, said shaft and said moon-bar being formed of detachable sections, substantially as described.

8. In apparatus of the class described, the combination, with the orbit-bar and an earth-shaft at its outer end and means for rotating said orbit-bar and said earth-shaft, of a moon-bar carried by said earth-shaft, gear mechanism whereby said moon-bar may be rotated about said earth-shaft, suitable gear mechanism for imparting rotation to said moon-shaft, a counter-shaft at the end of said moon-bar for supporting the moon-ball, and suitable means for rotating said counter-shaft, said moon-bar and said moon-shaft being formed of detachable sections, whereby a portion of said moon-bar and of said moon-shaft and said counter-shaft can be removed, substantially as described.

9. In apparatus of the class described, the combination, with the orbit-bar and the earth-shaft and means for rotating said earth-shaft, of a moon-bar formed of detachable sections, a moon-shaft within said bar, also formed of detachable sections, said moon-bar being provided with an opening whereby the engagement of the sections of the moon-shaft can be readily seen, substantially as described.

10. In apparatus of the class described, the combination, with the orbit and the earth-bar and means for rotating said earth-bar, of a moon-bar sustained by said orbit-bar, a moon-shaft within said moon-bar, a post at the outer end of said moon-bar and geared to the moon-shaft, a bracket on said post, and a vertically-adjustable moon-ball sustained upon said bracket in a manner free to turn both in horizontal and vertical directions, substantially as described.

11. In apparatus of the class described, the combination, with the orbit-bar and the earth-shaft and means for rotating said earth-shaft and orbit-bar, of a moon-bar and a vertically-adjustable moon-ball sustained at the outer end of said moon-bar, said moon-ball being mounted in a manner free to revolve, and a support for said moon-ball, around which said moon-ball can be turned and adjusted, substantially as described.

12. In apparatus of the class described, the combination, with the earth-globe, of a circle of illumination and a twilight-circle, said twilight-circle being provided with a hinged section, and a catch whereby said circles may be held in accurate alignment, substantially as described.

13. In apparatus of the class described, the combination, with the orbit-bar, the earth-shaft, and the bar for sustaining the twilight and illumination circles, of a spring-arm adapted to connect said bar to the orbit-bar, substantially as described.

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