M. MacVICAR.

2 Sheets—Sheet 1.

Tellurian.

No. 205,111. Patented June 18, 1878.

Fig. 8.

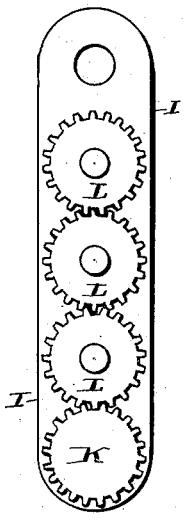
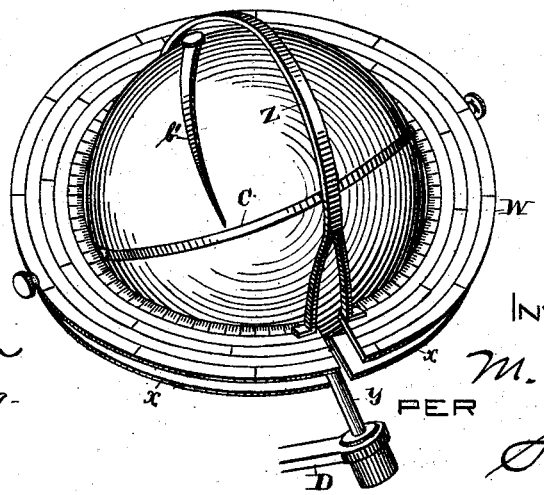


Fig. 1.

Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

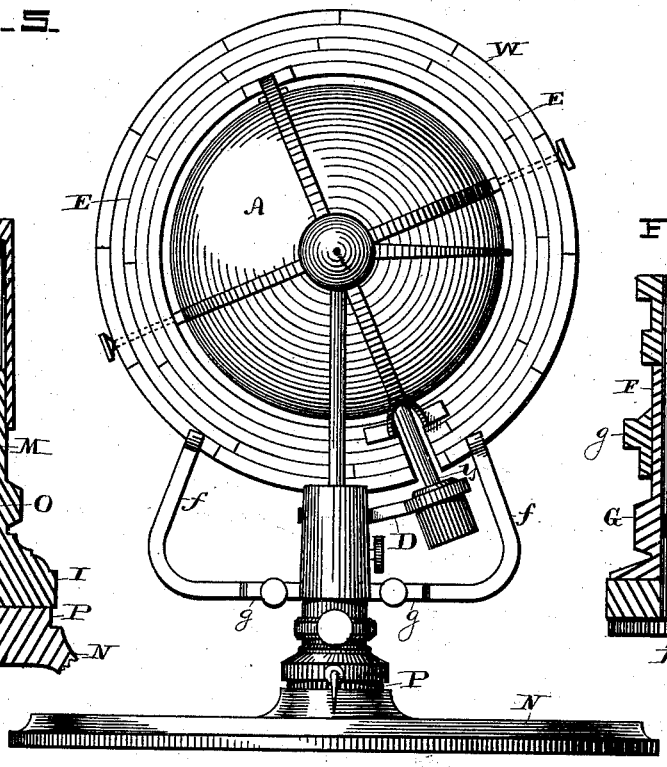


Fig. 5.

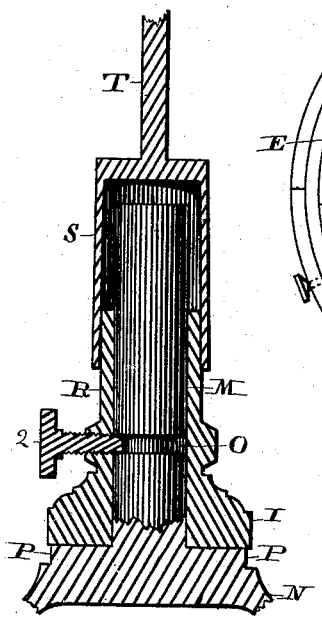


Fig. 6.

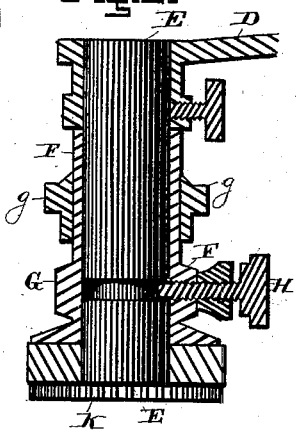


Fig. 7.

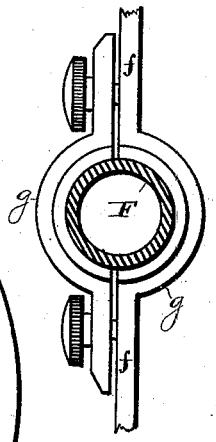
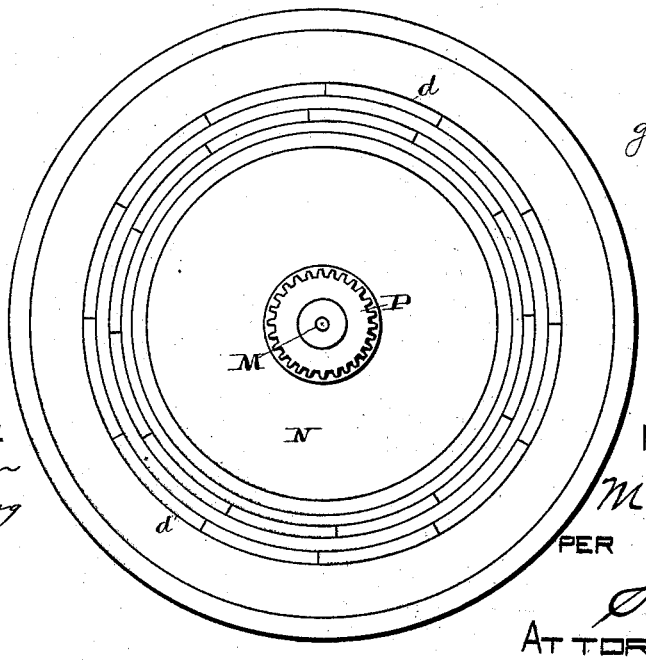


Fig. 4.



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UNITED STATES PATENT OFFICE.

MALCOLM MACVICAR, OF POTSDAM, NEW YORK.

IMPROVEMENT IN TELLURIANS.

Specification forming part of Letters Patent No. **205,111**, dated June 18, 1878; application filed March 14, 1878.

To all whom it may concern:

Be it known that I, MALCOLM MACVICAR, of Potsdam, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Tellurian-Globes; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to certain improvements upon the globe known as "The MacVicar Tellurian-Globe," for which Letters Patent No. 168,514 were granted October 5, 1875, which is used for illustration in geography and astronomy; and consists in a globe having a horizon provided with a twilight-circle, a meridian secured to the horizon, an attachment by which the horizon can be held perpendicular to the plane of the ecliptic, a time-index, a calendar-index, and a direction-index; and in the construction and combination of minor parts, all of which will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention relates or is most nearly connected to make and use the same, I will now proceed to describe its construction and operation, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is an elevation, showing a side view of the meridian, with a pointer attached thereto, being a modification of the arrangement shown in Fig. 2 of drawing, with the pointer secured to the globe-axis. Fig. 2 is a perspective view. Fig. 3 is an elevation, showing a front view of the meridian. Fig. 4 is a top view of the base. Fig. 5 is a detail view, showing the standard. Fig. 6 is a detail view, showing the shaft. Fig. 7 is a detail view, showing the clamp. Fig. 8 is a bottom view of the arm.

A represents an ordinary terrestrial globe, revolving freely upon its axis B, and provided with an equator, C, having a free and separate revolution upon the axis B independent of the globe. The globe is mounted by one end of its axis being fastened upon an arm, D, which is of suitable length, and attached to the shaft E, having an inclination of about twenty-three and one-half degrees.

The shaft E is provided with a groove, G, and is held in its place by means of a set-screw, H, passing through a collar, F, and into the groove. The collar F rests upon an arm, I, down through both of which the shaft E passes. This shaft has a gear-wheel, K, attached to its lower end, which meshes with, and receives motion transmitted by, a train of gear-wheels, L, pivoted to the lower side of the arm I.

The arm I, at its inner end, encircles and revolves freely upon a standard, M, set in the center of the apex of a base, N, causing the standard to act as the pivot of the tellurian.

The standard M is provided with a groove for the reception of a set-screw after the standard has been passed through an opening in the arm I and up through the collar R, which rests upon and is attached to the arm I, as shown in Fig. 5 of drawings.

Around the lower end of the standard, and rigidly attached to the apex of the base N, is a gear-wheel, P, which engages with the train of gear-wheels L when the arm I is in position.

Upon the top of the collar R a cap, S, is snugly fitted, which bears the standard T, upon the top of which is mounted a ball, U, to represent the sun. Through the center of this ball an adjustable rod, V, is passed, and held by means of a set-screw, as shown in Fig. 1 of drawings.

To the equator C, upon opposite sides of the globe, at points one hundred and eighty (180) degrees apart, is pivoted a belt, W, which will hereinafter be termed a "horizon," as it is so attached to the globe A that it can be made to represent the horizon of any given place on the surface of the globe A. To this horizon is attached a circular table, E, having marked on it the months and days of the year, the signs of the zodiac, the points of the compass, and the degrees of a circle.

Another belt, X, is placed about eighteen (18) degrees back of the horizon, to represent the limit of twilight when the horizon is used to represent the circle of illumination, and is attached to the horizon by stays. This belt will hereinafter be called the "twilight-circle."

Both the horizon and twilight circles have an opening, Y, in their lower section, to permit of the passage of the axis of the globe. The top and bottom of the horizon are con-

nected by a semicircular strap, Z, forked at the lower end to straddle the opening Y, which serves as a substantial brace for strengthening the horizon, and describes a vertical line, which I designate as the "meridian." Midway between the extremes of this meridian I place a hollow tap-bolt, *a*, which may be used, when desired, to receive the rod V and to hold a pointer, *b*. This pointer may be attached to the meridian, as shown in Figs. 1 and 3, or to the axis of the globe, as shown in Fig. 2. An index, *c*, is also attached to the inner end of the arm I, as shown in Fig. 1 of drawings, for use, in connection with the circle attached to the base, as shown in Fig. 4 of drawings, to indicate the months and days of the year, the signs of the zodiac, the points of the compass, and the degrees of a circle.

To the collar F are attached adjustable guides *f f* by means of clamp *g* and thumb-screws, as shown in Fig. 7 of drawings. These guides extend at right angles from the collar for a suitable distance, to permit of the revolution of the arm D. They are then curved upward, and extend to the edges of the horizon. The ends of these guides are slotted to receive the edge of the horizon, and are so constructed and arranged as to permit the horizon to travel upon the line of its periphery, but to restrain any other movement.

The operation of my device is as follows: The tellurian being in the position shown in Fig. 1 of the drawings, the movement of the arm I either to the right or left around the standard M causes the globe to traverse a circle around the ball U, representing the path of the earth around the sun. By this movement motion is generated in the train of wheels L, geared with the stationary spur-wheel P. This motion is transmitted to the shaft E through the spur-wheel K. But one revolution only of the shaft E takes place, as the wheels are all of equal diameters.

The globe being pivoted upon the arm D, with the line of its axis intersecting the line of the shaft E at the center of the globe at an acute angle of twenty-three degrees twenty-eight minutes, causes the ends of the axis representing the poles of the earth to traverse a circle whose diameter equals forty-six degrees fifty-six minutes of the circumference of the globe with each revolution of the shaft E.

During this movement the horizon, being pivoted to the equator, is held in a vertical position by and moves freely in the guides forward and backward a distance equal to the diameter of the circle described by the poles, carrying the meridian with it, which is at all times held in a vertical position in its relation to the globe.

The same result with regard to the movement of the horizon and meridian may be attained by loosening the clamp *g* and lowering or removing the guides *f f* from contact with the horizon and retaining the rod V inserted in the hollow tap-bolt *a*, as shown in Fig. 1 of drawings; or the rod V may be removed, and the guides alone left to retain the horizon in position, as shown in Fig. 3 of drawings.

During this movement the index *c* passes over the calendar *d* with the revolution of the arm I, and indicates the date at which the earth and sun will be found occupying the relative position indicated by the tellurian.

In order to insure this result the following adjustment of parts must be observed: The arm I must be revolved until the index *c* points to one of the equinoxes. The rod V must be inserted in the hollow tap-bolt, and, when used instead of the guides *f f*, must be parallel with the arm I. The globe must then be revolved around its axis until a given locality is brought beneath the meridian. The thumb-screw in the collar holding the arm D to the shaft must then be loosened, and the arm D revolved until the equator is brought beneath the point of the rod V, and the thumb-screw tightened. In the course of the daily revolution of the earth every different locality in a given latitude will be brought beneath the meridian. The horizon, being held perpendicular to the plane of the orbit of the globe and always facing the sun, will indicate the hemisphere, or one hundred and eighty degrees of the earth's surface, upon which the light and heat of the sun fall upon the day indicated by the index upon the calendar.

The twilight-circle, being permanently attached to the horizon, accompanies it in all its movements, and illustrates, in conjunction with the horizon, three divisions of the earth with reference to the light of the sun, to wit: The hemisphere of light, twilight belt or zone of reflected light, and that part or section in which no light is received from the sun and darkness prevails.

The long polar days, twilights, and nights are clearly illustrated by this device during the movement hereinbefore described.

The horizon can be set for any locality desired by removing the guides and rod V and loosening the set-screws. The horizon will then revolve freely, and can be adjusted upon any circle passing through its pivotal points, and can be held fast by tightening the set-screws.

When the horizon is adjusted in this manner the pointer *b* is removed from the end of the axis, and is held beneath the hollow tap-bolt in the center of the meridian, so as to have a free movement.

The horizon may be adjusted parallel with the equator by bringing the meridian immediately over the axis, and a pointer, *b'*, attached to the axis. In this position the pointer remains stationary when the globe is revolved upon its axis, and will designate upon the calendar the number of degrees between given points, thus assisting in the calculation of the difference of time.

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

1. An adjustable horizon having a twilight-

circle attached thereto, pivoted to the equator and extending around the globe, substantially as shown and described.

2. The combination of a horizon adjustably pivoted to the equator, with a meridian, substantially as shown and described.

3. A globe revolving freely around its axis, and provided with a stationary equator, in combination with a stationary axis, having a pointer attached to its upper extremity and extending to the equator, substantially as shown and described.

4. A pointer attached to the upper end of the axis of the globe, and extending to a point adjacent to the equator, substantially as shown and described, all arranged and operating so as to point to a calendar upon the equator and remain stationary when the globe is revolved upon its axis.

5. The combination of the globe A, horizon W, and meridian Z with the standard T and rod V, the latter being adjusted to hold the horizon in a vertical position during the passage of the globe around the sun, as set forth.

6. Adjustable guides *g g*, substantially as shown and described, all arranged and operating to prevent the lateral movement of the horizon, while permitting its longitudinal movement, substantially as shown and described.

7. The collar F and guides *g g*, in connection with the horizon, whereby the latter is held at all times facing the ball representing the sun, substantially as shown and described.

8. The combination of the arm I, index *c*, and calendar *d*, substantially as shown and described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

MALCOLM MACVICAR.

Witnesses:

GEO. S. ERWIN,

HIRAM KIMBALL.