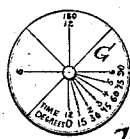
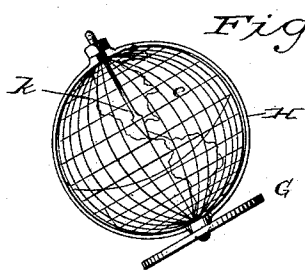
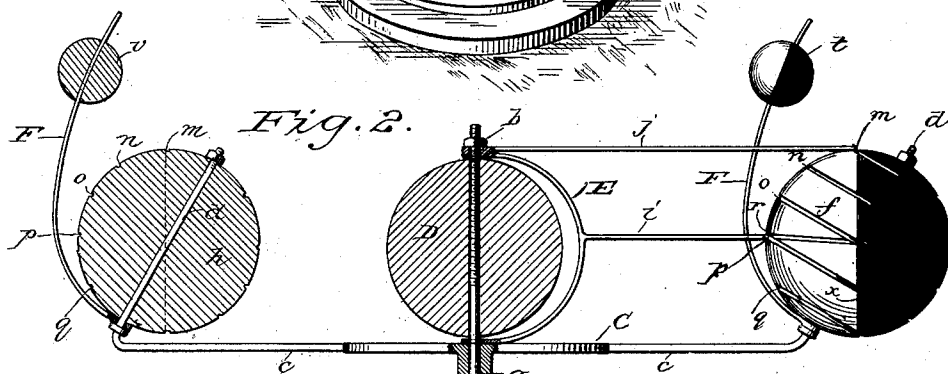
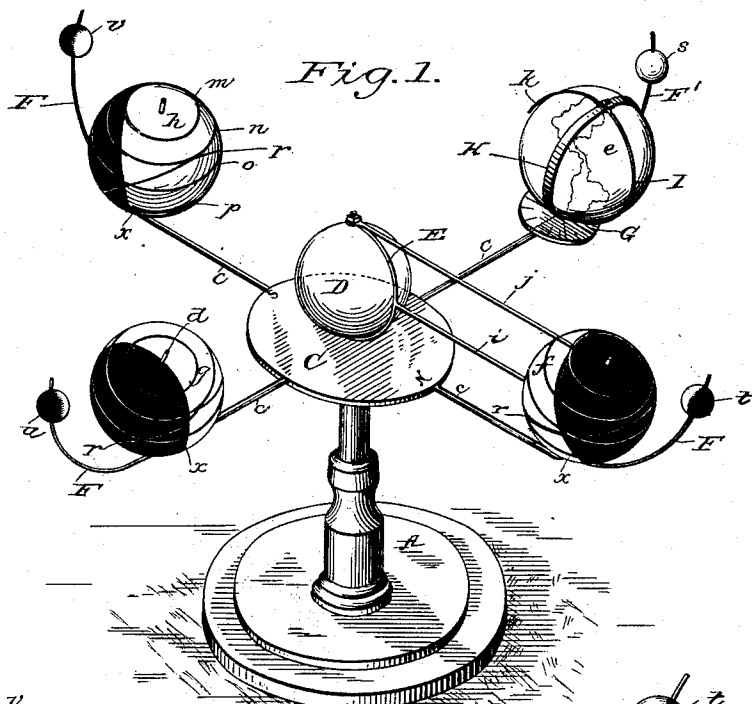


(No Model.)

W. L. HOLDEN.
TELLURIAN.

No. 374,409.

Patented Dec. 6, 1887.



Witnesses
Geo. W. Young,
Maurice F. Shear.

Inventor
Wm L. Holden
By *Sturges & Wood*
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM L. HOLDEN, OF MERRILL, WISCONSIN.

TELLURIAN.

SPECIFICATION forming part of Letters Patent No. 374,409, dated December 6, 1887.

Application filed August 13, 1887. Serial No. 246,817. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. HOLDEN, of Merrill, in the county of Lincoln, and in the State of Wisconsin, have invented certain new and useful Improvements in Tellurians; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to tellurians, and will be fully described hereinafter.

10 In the drawings, Figure 1 is a perspective view of my invention. Fig. 2 is a vertical central section through the same, and Figs. 3, 4, and 5 are details.

15 A is a stand, through which is passed from the bottom a stem, B, which projects above the stand to receive the hub *a* of a frame, C, and above that a ball, D, which represents the sun. The upper end of stem B is screw-threaded to receive a retaining-nut, *b*, and also to engage with screw-threads in the ball 20 D, which is preferably of hard wood. The frame C has arms *c* radiating from it, which arms terminate in inclined spindles *d*, each to receive a globe or representation of the earth and to form an axis therefor.

25 The earth-globes are lettered *e f g h*, respectively, for convenience in designation. The spindles *d* are all inclined in the same direction at an angle of twenty-three and one-half degrees from a vertical.

30 E is an index-frame, which is pivoted to the stem B and has two fingers—one, *i*, that represents the direct rays of the sun, and *j*, that indicates the distance the sun's rays lack of reaching the north pole or extend beyond it.

35 The globe *e* is of the ordinary school form and contains a map of the earth's surface, with the degree-lines fifteen degrees apart, while the other globes, *f g h*, are grooved, as at *m n o p q*, to represent the various zones and to receive the outer end of finger *i*.

40 The center of frame C, which is elliptical, is marked with the principal points of the compass, and the spindle of globe *e* is provided with a plate, G, that is scaled, as shown, in time and degrees. Each spindle *d* has 45 loosely pivoted at one end below its globe a curved arm, F, and each of these arms carries a globe representation of the moon, which I 50 letter *s t u v*, respectively. The globe *s* is entirely white or of a single light color, prefer-

ably bronze, while the others, also representing the moon, are half black, as shown.

The spindle of globe *e* carries a cage consisting of a ring, H, that entirely surrounds the 55 globe *e* from pole to pole, and a band, I, that extends from one pole to the other at right angles to ring H, the band I having an extension, *k*, that projects over the globe to the side opposite band I to form a pointer, as will be 60 more fully described hereinafter.

The upper arm only of index-frame E is pivoted to stem B, and that loosely, and its lower arm is merely bifurcated to receive the stem B below the globe, which stem prevents 65 the finger *i* from dropping below a horizontal line, while it may rise to adjust itself to the grooves on the globes.

As shown in Fig. 1, the sun D has a fixed central position and the four globes *e f g h* 70 represent the earth in its revolution about the sun—*e* representing the earth on the 21st of March; *f*, the 21st of December; *g*, the 21st of September, and *h* the 21st of June, and with each a representation of the moon. 75

Globes *e* and *g* represent the position of the earth with relation to the sun on the 21st days of March and September, respectively, when the days and nights all over the world are equal, and globes *f* and *h* represent the earth's 80 position on the 21st days of December and June, respectively.

The finger *j* of frame E points to the extreme line reached by the sun's rays on the 21st day of December. (See Fig. 2.) If the 85 frame were shifted so that its fingers pointed to the globe *h*, the finger *j* would show how much the sun's rays extended beyond the north pole, while the finger *i* would show just where the vertical rays from the sun strike 90 the earth. To illustrate, take the globe *h*, which shows the earth at the 21st of June. At this time the sun is directly overhead at the tropic of cancer, and the finger *i* will project into the groove *n* when turned toward the 95 globe *h*. Now, if globe *h* be turned once on its axis, the finger *i* will remain in the groove *n*, showing that the tropic of cancer is marked by the vertical rays of the sun on the 21st day of June, and finger *j* projects twenty-three and 100 one-half degrees beyond the north pole at this time, showing that the sun's rays extend

this far beyond the north pole, making day over the entire north frigid zone during a complete revolution of the earth. The ecliptic is indicated by groove *r*.

5 To indicate the position of the sun's rays on the 21st of September, the frame E is swung around so that its fingers point to globe *g*. In this position finger *i* will strike groove *o*, that represents the equator, and if the ball
10 be revolved at this time once around on its axis the finger *i* will mark the equator, finger *j* extending just to the north pole, showing that the rays of the sun reach just to that point. Then, to get the position of the sun's
15 rays on the 21st of December, swing the frame E into the position shown in Fig. 2, and if globe *f* be revolved at this time the vertical ray will be shown as marking the tropic of capricorn, the finger *j* lacking twenty-three and
20 one-half degrees of reaching the north pole. Now, to show the position of the sun's rays on the 21st of March, the frame E is swung so that its fingers point to globe *e*, when the sun's rays will be as on the 21st of September. The
25 comparative length of day and night is indicated by the shading, light representing day and dark representing night, except on globe *e*, when the cage may be shifted so as to make either of its bands show the dividing line be-
30 tween day and night.

My device clearly illustrates the gradual decrease in length from the longest day at the north frigid zone down to the shortest or no day at all at the south frigid zone, and vice
35 versa, and the according increase and decrease of the length of nights. The light band *x* indicates twilight.

Now, to illustrate the various phases of the moon, the balls *s t u v* move freely on their
40 spindles, being only sufficiently tight to stay where they are put. The curved arms F, that carry the globes *t u v*, swing freely on their pivots, but the arm F' of globe *s* is attached rigidly to the band H, so as to always turn with
45 the band as the band turns on its pivot independently of the globe *e*.

Any four phases of the moon may be shown at the same time by my apparatus. For instance, in Fig. 2 the globe *t* is set between the
50 sun and earth, and therefore the illuminated side is from the earth. Now, if this globe be moved one-eighth way around the axis of the earth *f* and the globe *t* be turned accordingly, its different phases may be exhibited from the
55 dark of the moon to crescent and from crescent to full moon, and so on through all of its stages. As there are four globes representing the moon, they may be placed in four different positions at once.

60 To explain the tidal wave, illustrating from globe *e*, to get the spring tide I place the globe *s*, representing the moon, between the globe *e* and the sun. The band H will then represent the wave immediately below the
65 moon on one side, and on the opposite side of globe *e* the band H also represents the tidal wave, the highest portion of the wave being

indicated by the widest portion of the band, and when the ball is opposite or on the farther side of the earth from the sun the same
70 effect is produced.

To show neap or low tides, place the sun, moon, and earth in such a position that a line drawn from the sun to the earth and from the earth to the moon would make a right angle.
75 When in this position, the band H will indicate the greater wave formed by the moon's attraction, and the pointer K and band I will indicate the wave formed by the sun's attraction, which is smaller than that of the moon.
80 Now, revolving the globe *e* beneath the bands H and I will show the rise and fall of the tide produced at different points, or how these points come under the influence of the sun and moon as the earth revolves on its axis.
85

To illustrate the yearly motion of the earth around the sun, remove the index-frame E, loosen the sun on its stem, and, holding the frame at an angle of about forty-five degrees to the body, turn the frame C so that the globe *e*,
90 representing the earth, will revolve about the sun, and as this globe revolves about the sun the moon will gravitate about the earth *e*, at the same time carrying with it the bands that indicate the tidal waves.
95

To represent time and space, place the band H directly under the sun. All places directly under this band will have twelve o'clock m. The part of the band on the other side of the earth will indicate twelve o'clock p. m. The
100 other band, I *k*, will then represent six o'clock a. m. and six o'clock p. m. On the plate G, below the globe *e*, a dial of degrees and hours is shown, and the hour twelve m. is where the sun is directly opposite the earth or overhead,
105 and the degree 0 is at the same point, and from thence the hours number from 1 up and the degrees from 0 to 15 and from 15 to 30, and so on, fifteen degrees corresponding to each hour. The longitudinal lines on the globe
110 are also fifteen degrees apart.

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

1. In a tellurian, the combination, with a
115 central ball representing the sun, of globes showing the earth in its different positions in its orbit and an index-frame having a finger indicating the vertical rays of the sun and adapted for adjustment to any one of the
120 globes representing the earth, substantially as described.

2. The combination, with the stand and a central globe representing the sun, of an index-frame having fingers representing, one the
125 vertical rays of the sun and the other the distance which the rays of the sun lack of reaching or extending beyond the poles of the earth, and one or more globes representing the earth, substantially as described.
130

3. The combination, with a stand and a central globe representing the sun, and an index-frame and its finger representing the vertical rays of the sun, of a globe representing the

earth and having grooves to receive the end of the aforesaid finger, said grooves corresponding with the dividing-line between the zones of the earth, substantially as described.

5 4. The combination, in a tellurian, of a stand, a stem projecting up through it, a frame for carrying the globes that represent the earth and moon, a globe representing the sun, and an index-frame, all supported by the stand
10 and its stem, substantially as described.

5 5. The combination, with the globe representing the earth and its cage, of a curved arm and a globe representing the moon arranged to turn and slide thereon, said arm being fixed rigidly to the cage, substantially as
15 described.

6. The combination, with a stand and a central globe representing the sun, of other globes representing the earth, each globe so shaded as to indicate the position of the earth with
20 relation to the rays of light from the sun at different seasons, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.
25

WILLIAM L. HOLDEN.

Witnesses:

S. S. STOUT,
MAURICE F. FREAR.