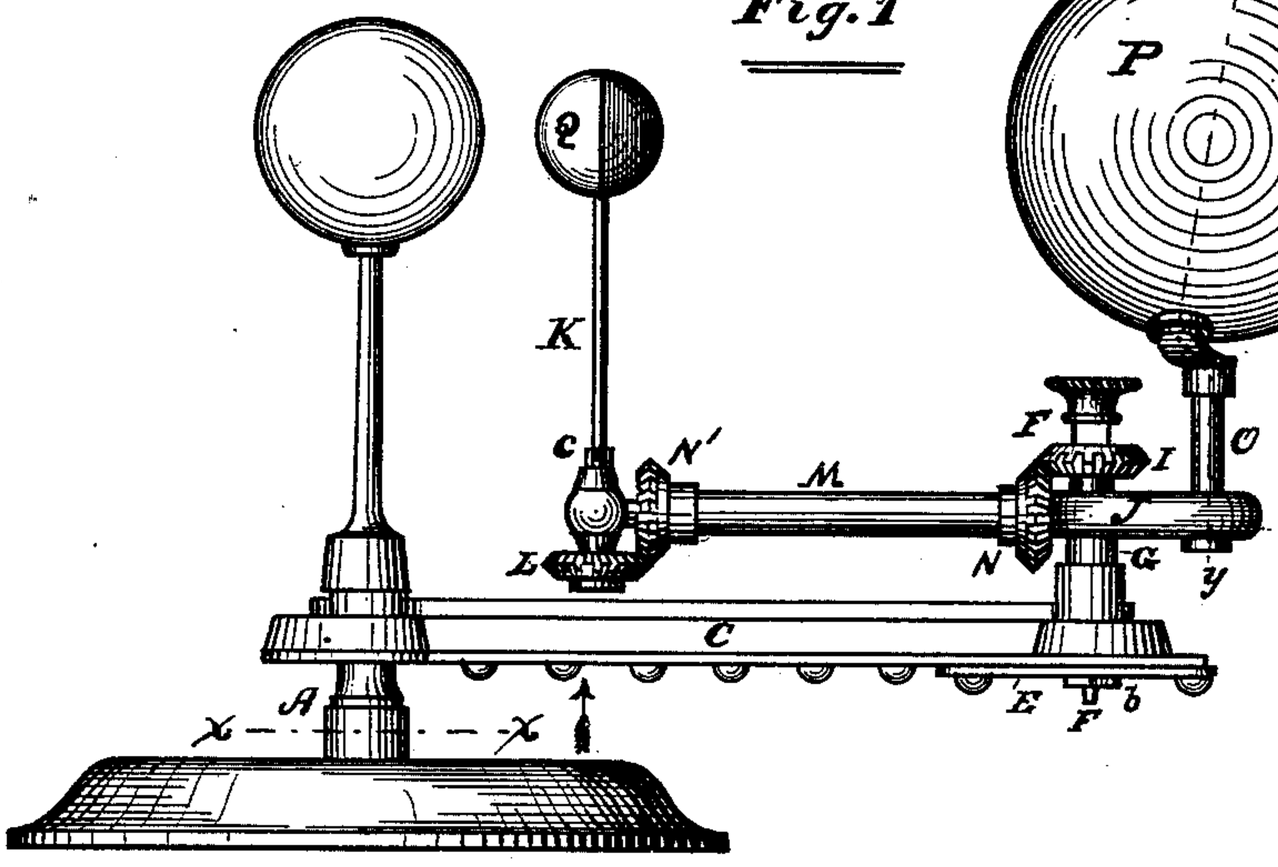
T. McDONOUGH.
Tellurian.

No. 234,050. Patented Nov. 2, 1880.

Fig. 1



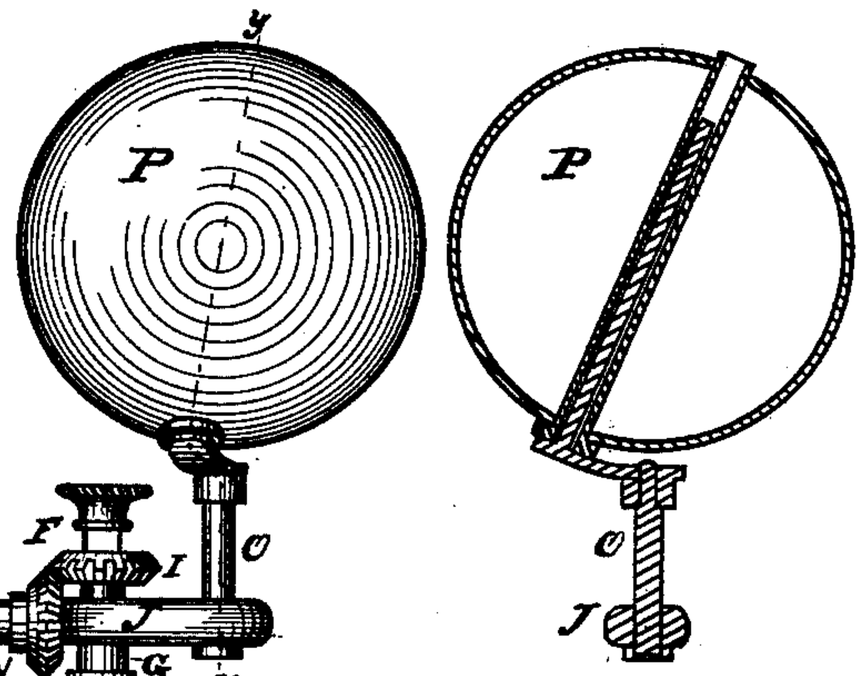


Fig. 4

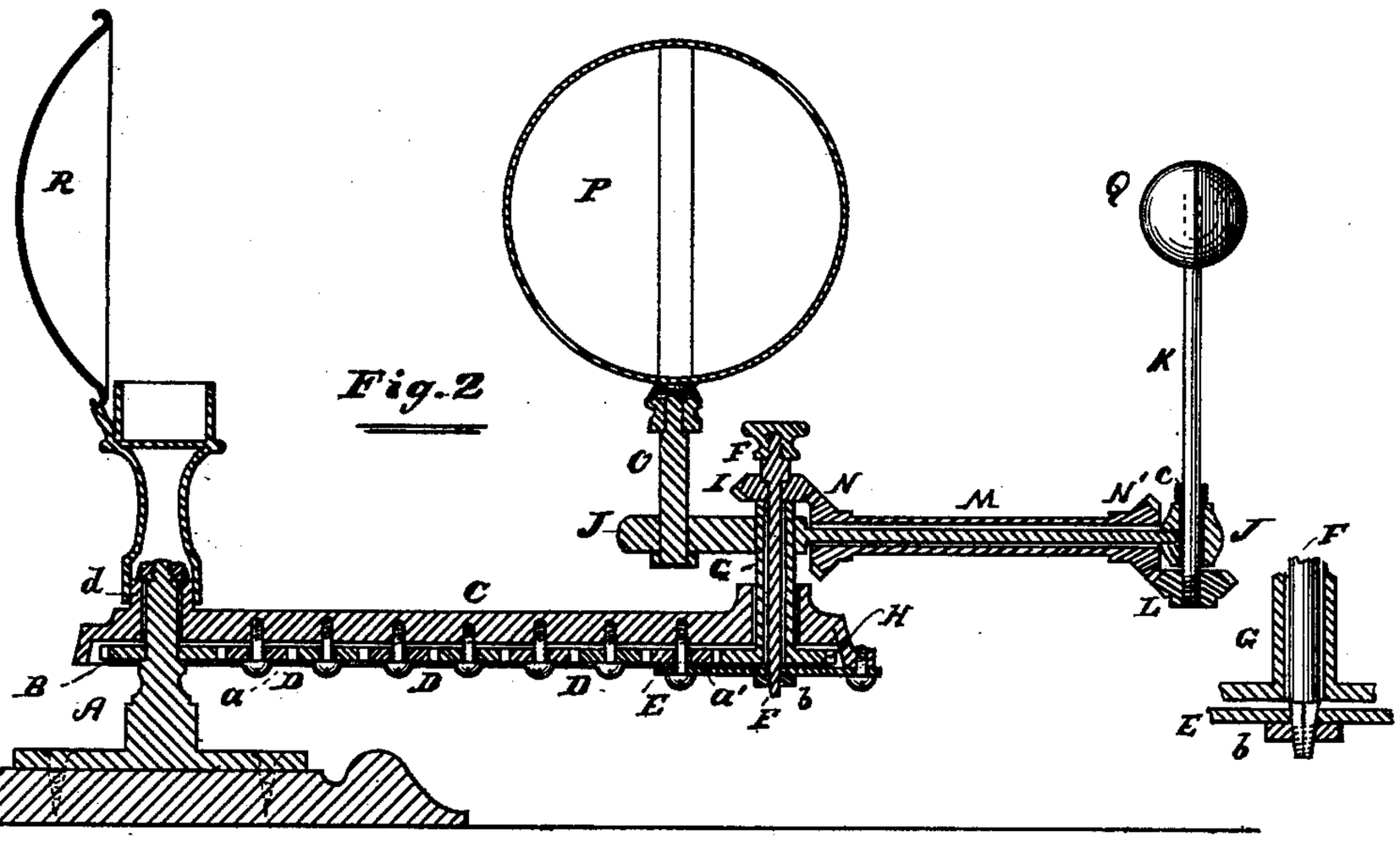


Fig. 2

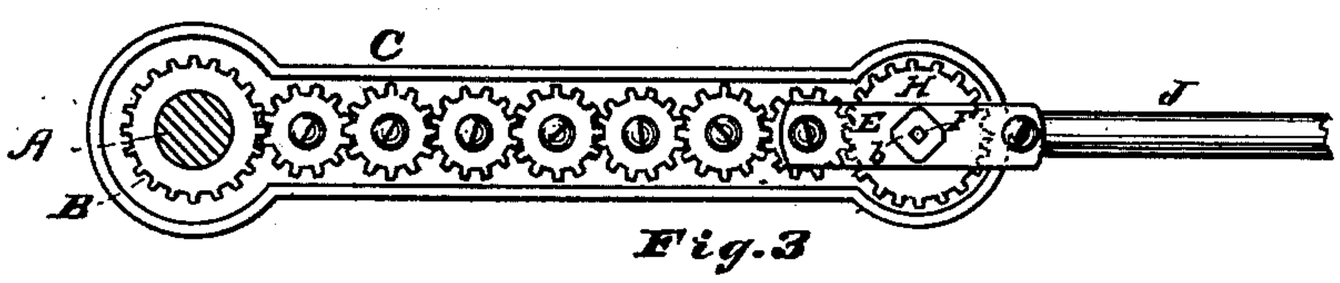


Fig. 3

Attest:
Charles H. Schoff
Jos. P. Whiting.

INVENTOR:
Thomas McDonough
By F. F. Harris his
Attorney.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS McDONOUGH, OF CHICAGO, ILLINOIS.

TELLURIAN.

SPECIFICATION forming part of Letters Patent No. 234,050, dated November 2, 1880.

Application filed August 14, 1879.

To all whom it may concern:

Be it known that I, THOMAS McDONOUGH, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tellurians, of which the following, in connection with the accompanying drawings, is a specification.

In the drawings, Figure 1 is a side elevation of an apparatus embodying my invention; Fig. 2, a vertical central section thereof; Fig. 3, a section in the plane of the line *x x* of Fig. 1, viewed in the direction of the arrow there shown, and Fig. 4 a section in the plane of the line *y y* of Fig. 3.

Like letters of reference indicate like parts.

A represents a standard for supporting my improved apparatus, and B is a spur-wheel mounted rigidly thereon. C is a horizontal arm turning freely at one end on the standard A.

D D are spur-wheels on the arm C, *a* being the first in the series forming the train and *a'* the last. All the wheels D D engage each other in succession, as is usual in trains of gearing of this class, and as is clearly indicated in Figs. 2 and 3.

E is a plate rigidly applied to the lower face of the arm C, and F is a vertical post rigidly connected to the plate E. This rigidity of the post F may be made to result by squaring the said post near its lower end, passing it through a correspondingly-formed opening in the plate F, and then clamping both together by means of a nut, *b*, as indicated by the detail view shown in proximity to Fig. 2.

G is a sleeve on the post F, and H is a spur-wheel rigidly applied to the lower end of the said sleeve, the plate E serving as a collar to support the gear H and its sleeve. I is a gear rigidly applied to the upper part of the post F.

The gear *a* engages the gear B and the gear *a'* engages the gear H. J is a horizontal arm rigidly applied to the upper end of the sleeve G. K is a vertical post or shaft passing freely through the outer end of the arm J, and *c* is a collar to support it there. L is a beveled gear or pinion rigidly applied to the lower end of the shaft K. M is a sleeve on the arm J, and N and N' are beveled gears rigidly applied to the ends of the sleeve M, and engaging the gears I and L respectively.

O is a vertical arm or post on or near one end of the arm J. The post O may consist of one or more parts and be bent or set at an inclination, as indicated at Fig. 4, to represent the axis of the earth, and P is a globe representing the earth, the inclination of the part O being such as to give a proper position to those parts of the globe P indicating or representing the poles of the earth, it being understood that the said globe is mounted on the part O. It is not essential, however, that the globe P should be mounted on the part O precisely as shown, for the desired result—viz., the inclination of the axis always in or nearly in the same direction during the orbital movements of the earth—will follow if the lower vertical part of the post O enters the globe P, the latter being so set thereon as to properly represent the position of the poles, as will hereinafter more fully appear.

Q is a small globe representing the moon, and mounted on the upper end of the post or shaft K, and made sufficiently rigid thereon to be rotated therewith.

R is a reflector representing the sun. This reflector is mounted on a hub, *d*, on the arm C, the said hub being arranged to receive the standard A, so that the reflector will always occupy a central, or nearly central, position in the larger orbits described by the globes representing the earth and moon, as will hereinafter more fully appear.

When a reflector is not desired a globe may be mounted directly on the standard A, as indicated in Fig. 1, or else extend directly above the same. The only object in applying a reflector to a hub, *d*, on the arm C is that the concave or bright face of the reflector may be always in the direction of the globes representing the earth and moon; but when a globe is employed instead of a reflector it is not essential that the globe should be rotated; but, as its relative position would not be materially changed by rotation when centrally arranged, it is immaterial whether it be rotated or not.

I deem it best, for the purpose hereinafter explained, to darken one-half the surface of the globe Q, as indicated in Figs. 1 and 2.

It will be perceived from the foregoing description and from reference to the drawings that the arm C turns pivotally at one end on

the standard A, and hence that the opposite end of the said arm moves in a comparatively large circuit or orbit about a point where an object representing the sun is arranged. It will also be perceived that the globes P and Q, representing the earth and moon, respectively, will thus be carried around the object representing the sun. Furthermore, it will be perceived that the arm J, during the movement of the arm C around its center, will move around the post F as a center, owing to the engagement of the fixed gear B with one end of the train D D and of the engagement of the other end of this train with the gear H on the sleeve G, on the latter of which the arm J is mounted. Consequently the globes P and Q, which are mounted on opposite ends of the arm J, will move in separate orbits about the post F as a center, while they also move in larger orbits about an object representing the sun, it being understood that the arm J is eccentrically mounted on its bearings, the globe representing the moon being at or near the outer end of the longer part of the arm J and the globe representing the earth being at or near the outer end of the shorter part of the said arm. The globe representing the moon is thus made to move in an orbit about the globe representing the earth, while both the said globes are moving in orbits about an object representing the sun, and the moon is thus moved between the objects representing the sun and the earth. Neither the globe representing the earth nor the one representing the moon, therefore, moves in a true orbit about the object representing the sun, for while moving in that orbit they also move in smaller orbits about a common center traveling with them in the larger orbit, and during all this time the part representing the axis of the earth is inclined in the same direction; also, owing to the fact that the globe representing the moon is rigidly mounted on a rotary shaft, and to the engagement of the mitered gears I N and L N′, respectively, applied and arranged as already described, the same face or hemisphere of the globe representing the moon is always toward the object representing the sun, and hence, as this is the bright side or face of that globe, it is sometimes presented to the globe representing the earth, and its position with relation thereto is so shifted during one orbital movement about the object representing the sun as to exhibit or illustrate all the moon's phases, whether full, half, or quarter, or other portion of the bright side be visible from the earth. While the relative positions of the sun, moon, and earth are thus illustrated in such manner as to indicate the monthly obscuration, or partial obscuration, of the moon from night to night during each month with sufficient accuracy to explain that phenomenon mechanically, it will also be observed that the variable distance between the earth and the sun is exhibited, and that the inclination of the earth's axis is preserved during all these movements.

I would regard belts or chains and pulleys as the equivalents of the gearing herein described for the purpose set forth; but I do not here intend to claim, broadly, the combination of gearing with the arms and globes of apparatus for illustrating mechanically the movements of the heavenly bodies, as I am aware that gearing of various kinds has heretofore been used for that purpose in such instruments.

The kind, size, and arrangement of the gearing necessary to accomplish the results herein described can easily be determined upon by those skilled in the art after my explanation of the nature and object of my invention.

The inclination of the axis of the globe Q enables me to illustrate the different positions of the earth with relation to the sun, and resulting in the different seasons of the year.

I am aware, however, that the axis has heretofore been so inclined, and I do not, therefore, here intend to claim such inclination broadly, but the means employed and herein described for keeping the inclination in the same direction during the movement about the central object.

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

The combination, in a tellurian, of the arm J, turning on a bearing between its ends, the globe P, representing the earth, and mounted on an inclined rotary axis carried on or near the outer end of the short arm or part of the arm J, and the globe Q, representing the moon, and having one-half its surface darkened and the other half bright, and mounted on a rotary arm or spindle carried on the other end of the arm J, all in connection with gearing for rotating the said axis and the said spindle during the rotation of the arm J on its bearing, and for keeping the bright side of the globe Q always toward a fixed point during the said rotations, substantially as and for the purposes specified.

THOMAS McDONOUGH.

Witnesses:
F. F. WARNER,
GEO. G. BELLOWS.