(No Model.)

W. PARKES & T. HADLEY.

TELLURIAN.

No. 470,074. Patented Mar. 1, 1892.

Fig. 6.

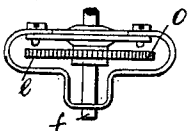


Fig. 2.

Fig. 4.

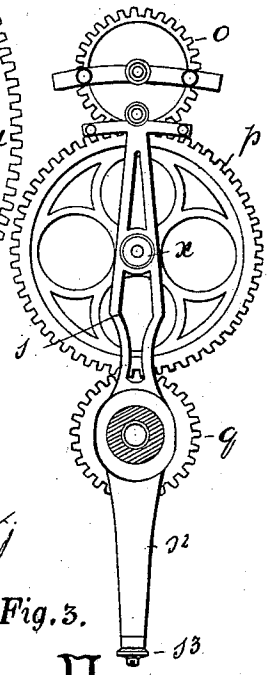


Fig. 5.

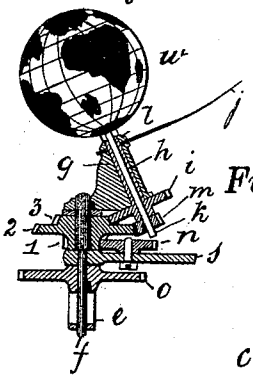


Fig. 1.

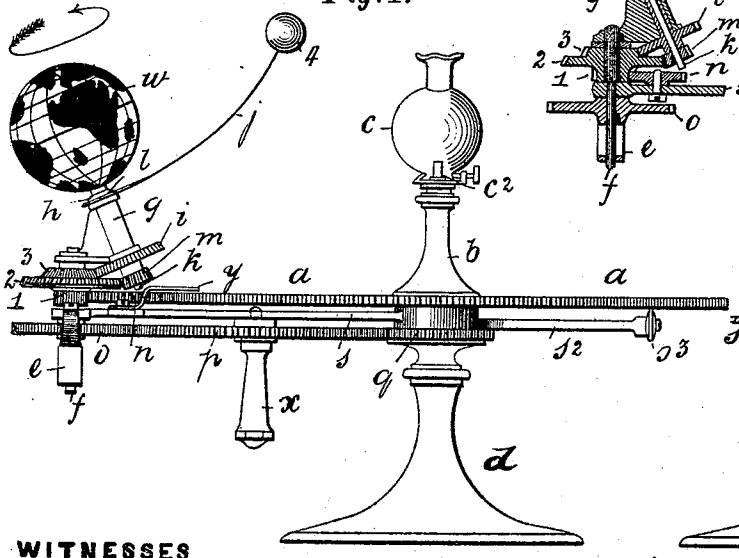
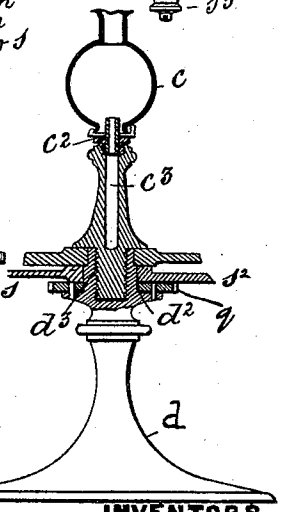


Fig. 3.



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TELLURIAN.

SPECIFICATION forming part of Letters Patent No. 470,074, dated March 1, 1892.

Application filed June 13, 1890. Serial No. 355,310. (No model.) Patented in England March 21, 1889, No. 4,922.

To all whom it may concern:

Be it known that we, WILLIAM PARKES, engineer and machinist, residing at Wood Street, Birmingham, England, and THOMAS HADLEY, schoolmaster, residing at Talbot Street, Oldbury, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Orreries, (for which Letters Patent have been granted in England, dated March 21, 1889, No. 4,922;) and we do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to an improved tellurian or orrery designed and constructed specially for elementary school-teaching; or, in other words, it consists of an instrument for demonstrating particularly the phenomena of the motion of the earth about the sun at the same time that the moon revolves about the earth, and by which phenomena the changes in the relative positions of the bodies with respect to each other—such as the succession of day and night—are demonstrated, also the variable lengths of both, according to the season of the year, and also the eclipses and various other phenomena attendant upon such motions.

Figure 1 of the accompanying drawings represents in side elevation an orrery constructed and arranged according to our invention. Fig. 2 represents a plan of the same. Fig. 3 represents a section of the middle part of the apparatus, showing the lamp, which is representative of the sun. Fig. 4 is a horizontal section taken on a line below the top of the instrument. Fig. 5 represents a transverse section of the gear-and-bracket connections of the gear of moon and earth. Fig. 6 represents the carrying-bracket and the third transmitting gyration-wheel.

The same letters and figures of reference indicate corresponding parts in the several figures.

a is a stationary wheel or plane with a toothed periphery and with the upper surface of the said plane provided with representations, by divisions or the like, of the months of the year, the seasons, and the cardinal points, and directed perpendicularly within the middle of the said wheel or plane *a* is a pillar *b*, surmounted by a lamp *c*, with globe, representative of the sun. The lamp is provided with a burner c^2 and oil-chamber c^3, while the toothed edge stationary wheel or plane is supported centrally upon a base *d*.

Our improvement consists in the mechanical arrangement (marked *k m i h j l* in Figs. 1 and 5) which causes the moon to travel in a path inclined to the path or orbit of the earth as she travels round the sun. A sleeve with a wheel attached to it is carried by a suitable bracket and revolves freely within it. This sleeve when in position makes an angle of twenty-three and one-half degrees with the vertical axis of the main shaft, and through the middle of the sleeve a spindle or axis with a wheel attached is arranged to turn freely within it, and upon the upper terminal end of the said spindle or axis the earth is carried. The movements of both sleeve and axis are independent of each other, so that by attaching a finger with a moon at its end to the top of the sleeve and motion being imparted to the two wheels with different velocities by a gear, as hereinafter described, we have for the revolution of the small wheel the diurnal motion of the earth and for the larger one the revolution of the moon around the earth.

The combination of wheels 1, 2, and 3 in Figs. 1 and 5, which may be cast integral, work freely upon a spindle *f* of a bracket *g*.

In the employment of the intermediate wheel *n*, which is pivoted upon a spindle secured to a radial arm free to travel around the central wheel *a*, the said intermediate wheel gears with the said large central wheel and the combination of wheels 1, 2, and 3, which gears 2 and 3 mesh with gears *m* and *i*, respectively. Motion being imparted to the arm will produce the diurnal and annual motions of the earth, and also the moon's revolution. Underneath the arm in Fig. 1 are represented three geared wheels. Wheel *o* is secured to the spindle carrying the bracket *g*, and wheel *q*, equal in size to wheel *o*, is secured to the neck of the base or stand, and the wheel *p*, secured to the arm and freely moving around its spindle, connects the two.

The large central wheel *a*, as aforesaid, is centrally bored to fit upon the neck d^3 of the base or stand *d*, while the arm *s* is also bored to fit upon the shoulder d^2 of the base or stand above the wheel *q* and move freely around it and carrying with it the earth and moon. The arm *s* is extended at s^2 with an anti-friction roller s^3, which rolls upon the under side of the wheel *a*, whereby the arm and parts carried by it are balanced. The suspension-saddle *y* is secured to the said arm *s* and is so arranged that the under side top of the said saddle rests upon or is approximate to the top surface of the wheel *a* adjacent to its toothed periphery. This saddle carries the whole of the gear and cognate parts of them, while a bracket *e* is secured to the outer end of arm *s*, and which bracket and arm respectively form the bearings which support the spindle *f*, secured to the bracket *g*. This last-named bracket *g* is bored to receive the sleeve *h*, which carries wheel *i*. To this said sleeve the finger *j*, carrying the moon 4, is attached. Passing through the axis of the sleeve is a freely-working spindle-axis *k*, which is held in position by means of a collar *l*. The wheel *m* is secured to the lower end of the said axis and the earth *w* carried at the other and upper end. Motion is imparted to the earth and moon by moving the handle *x* in the direction of the arrows, Fig. 2. By this means motion is then imparted to the intermediate wheel *n*, and from thence to wheel 1 in the group numbered 1, 2, and 3. Wheel 3 gears with wheel *i*, which gives motion to the moon, and wheel 2 with wheel *m*, which transmits motion to the earth. By the arrangement of the wheels *o*, *q*, and *p* as before described the inclination of the axis of the earth always remains constant. Thus by moving round the handle *x* in the direction of the arrow, as aforesaid, motion is imparted to the earth and moon in varying speeds, viz: The earth will rotate upon its axis and the moon will revolve in her path around the earth, and at the same time the earth and moon are slowly making their annual journey round the sun, the moon periodically crossing and recrossing the plane of the earth's orbit, illustrating the eclipse months.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a school-orrery, the combination, with the wheel or annual plane *a*, intermediate wheel *n*, lamp *c*, representative of the sun, pillar *b*, and stand *d*, of an inclined bored bracket *g*, connected to spindle *f*, stationary gear-wheel *q*, fixed on stand *d*, wheel *p*, meshing with wheel *q*, wheel *o*, set fast on shaft *f* and meshing with wheel *p*, wheel *i*, set fast on sleeve *h*, the group of gear-wheels 1 2 3, meshing with the said wheels *i* and *m*, all constructed and arranged and adapted for giving the axis of both earth and moon gyratory and annual motions, substantially as set forth.

2. In a school-orrery, the combination, with the wheel or annual plane *a*, bracket supporting it, lamp *c*, representative of the sun, bracket *g*, earth *w*, moon 4, and intermediate wheel *n*, of spindle *k*, on which the earth is axially mounted, wheel *m*, fixed on said spindle, sleeve *h*, surrounding the spindle *k*, wheel *i*, fixed on said sleeve, the group of wheels 1 2 3, spindle *f*, on which said group of wheels is loosely mounted, the wheel *o*, fixed on the spindle *f*, the wheel *p*, meshing with wheel *o*, and the stationary wheel *q*, mounted on the stand *d*, all constructed, arranged, and adapted to give to the earth diurnal motions and the moon its motion around the earth and periodically crossing and recrossing the plane of the said earth's orbit, thus illustrating the eclipse months, substantially as described and set forth.

3. In a school-orrery, the combination, with the wheel or annual plate *a*, intermediate wheel *n*, stand *d*, pillar *b*, lamp *c* and earth and moon globes, and suitable mechanism for imparting to both gyratory and annual motions, of an arm *s*, turning about the neck of the pillar as a center and provided with an extension s^2 and roller s^3 at its end, whereby the said gear and earth and moon are carried around the annual plane and balanced, substantially as described and set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 16th day of May, 1890.

WILLIAM PARKES.
THOMAS HADLEY.

Witnesses:
HENRY SKERRETT,
ROBERT EVANS,
Both of Birmingham.